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ABSTRACT

Described is the development and evaluation of an anticipation game for measuring the ability of 30 special class teachers to predict responses of 290 educable retarded secondary students. The game was based on normative data from the students' responses to a 70 item test. The evaluation phase is said to involve 15 teachers playing 30 rounds of the anticipation game and their subsequent predictions about 10 pupils' responses to 20 curriculum questions. Results are cited which suggest that the experimental teachers' prediction accuracy increases as a function of the number of rounds they played; that the anticipations of experimental and control group teachers were not significantly different; that teachers were more accurate predictors of higher IQ than lower IQ retarded students; and that teachers were more accurate in predicting responses for practical rather than academic questions. Seven appendixes include that test used in collecting normative data and two sample games. (CL)

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Anticipation Program

Research & Development

The Efficacy of an Anticipation Game In Increasing Teachers' Understandings of Educable Mentally Retarded Children

R. Bruce Baum

October, 1973

Final Report 26.3

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School of Education Indiana University Bloomington

THE EFFICACY OF AN ANTICIPATION GAME IN INCREASING TEACHERS' UNDERSTANDINGS OF EDUCABLE MENTALLY RETARDED CHILDREN[1]

Richard Bruce Baum

October, 1973

Final Report 26.3

Center for Innovation in Teaching the Handicapped

Indiana University

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Foreword

The Anticipation Research and Development Program is devoted to improving teachers' understandings of handicapped children. "Understanding in the present context is operationally defined as the ability to anticipate or predict responses of handicapped pupils to questions that are relevant to the school curriculum.

In previous work (M. Semmel, Garrett, D. Semmel,& Wilcove, 1973), we have demonstrated differential abilities among college students in anticipating the responses of retarded and nonretarded children. Anticipation skill was shown to be related to a number of experiential and personal variables. Drawing upon these and other findings, the Anticipation research team has embarked on a number of projects designed to aid better understanding of the phenomenon of teacher anticipatory behavior and to develop innovative procedures designed to improve the teacher-trainees' understandings of handicapped pupils through increasing anticipation skills. Our initial efforts toward these objectives have focused on the development and assessment of a series of teacher-training games (Semmel, 1972).

In this report, Baum presents a comprehensive research and development project which included the construction of an Anticipation Game, the evaluation of its effects on in-service teachers, and an attempt to assess the transfer validity of skills derived from playing the game.

Specifically, the study was comprised of two developmental and two evaluative phases. The developmental components involved the acquisition of a body of normative data through the administration of a 70-item test to 290 secondary level EMR children in Cincinnati, Ohio.

An anticipation game was then designed and constructed incorporating the student response data to the 70-item test.

The evaluative components entailed assessing the anticipation efficiency of teachers as they acquired experience playing the game, then evaluating their predictions of the responses of children selected randomly from their own classes. The procedures for the evaluation aspect involved, first, the random division into equal groups of 30 junior and senior high school special class teachers whose students had responded to the 70-item instrument. The 15 experimental-group teachers played 30 rounds of the anticipation game while the 15 control-group teachers played a game not designed to develop anticipation abilities. The second part of the evaluation phase required criterion measure predictions by both experimental- and control-group teachers of the responses of 10 children selected randomly from their own classes to 20 questions relevant to the curriculum for EMR pupils.

Data analysis revealed that, within the context of the anticipation game, dyadically grouped (by participants), experimental teachers' increased significantly in their prediction accuracies as a function of the number of rounds they played indicating that they did learn to become more precise anticipators through participating in the intervention. Analysis of the transfer of anticipation skills to classroom-pertinent anticipations showed that all teachers were able to predict pupil responses with nearly 60 percent accuracy. However, the anticipations of experimental- and control-group teachers were not significantly different, indicating that the skills developed through the treatment did not transfer to the teachers' anticipations of their own pupils.

Teachers were found to be more accurate predictors of higher IQ than of lower IQ EMR students; and they were better in predicting questions of a practical-functional nature than questions dealing with "academic" content. Although it was not significant, there was a trend for males to overpredict the responses of EMR pupils.

Within the limits of the study, it was suggested that a game format appears effective in developing anticipation skills in teachers. The potential value of viewing anticipation from an idiographic or individual perspective was also considered.

M.I. Semmel

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The author is grateful to the Cincinnati Public School System and its Divisions of Program Research and Design and Special Education for allowing the study to be conducted within the Cincinnati Schools.

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CHAPTER I

INTRODUCTION

A fundamental assumption in the present work is that efficient learning is contingent to a considerable extent upon a teacher's understanding of the children he teaches. Gage, Leavitt, and Stone (1955) have pointed out that because of the sheer reasonableness of this proposition (i.e., that teachers should understand their pupils) many of its implicit assumptions have remained unanalyzed. The importance of the influence teachers' understandings have on the way children view their school, themselves, and other children and on the rate at which children learn has been emphasized by Bills (1966). However, a definitional problem arises in attempting to operationalize the criteria which constitute _understanding the pupil_ within an educational context. The multiple meanings to which "understanding" can refer and the need for definitional criteria have been noted by Gage, _et al_. (1955) and Thiagarajan (1971).

Theoretical Views of Understanding

In analyzing the importance of understanding, some of the concepts posited by Kelly (1955) in his development of a cognitive dissonance model of personality are germane. According to Kelly, men approach living as do scientists in that they engage in the pursuit of truth through formulating hypotheses, then testing those hypotheses empirically in the "real world." To pursue truth in this manner, individuals engage in the construing of events--an interpretative process through which events are classified so that they can be better understood. The understandings acquired through construing experiences allow the formation of constructs or categories of thought (i.e., good-bad) which aid individuals in anticipating or predicting future occurrences. Thus, Kelly views men as continually attempting to understand events through prediction and control of experiences. In this manner, individuals can achieve certainty about their experiences, and their subsequent performances or behaviors can be based on accurate predictions.

When, in anticipating the future, individuals favor one pole of a construct rather than the other, their selection is based upon a perception of the pole through which they can achieve the greatest understanding of events. When constructs lead to inaccurate predictions, they are changed and new predictions are tested. Support for some of Kelly's theoretical notions has been generated through empirical research (Bieri and Blacker, 1956).

DeCharms' (1968) views of the attribution process are comparable to Kelly's (1955) theory of construct development. The process is essentially a matching between observed behaviors and conceptual categories supplied by the past experience of the observer. This matching process leads, in turn, to the development of personal constructs. When observed facts fit closely with personal constructs, the person will have a feeling of certainty about his explanation and his attribution of characteristics will be satisfying to him.

In discussing the possible mismatch between constructs and observed behaviors, DeCharms posits that the individual who finds he has incorrectly attributed intentions or characteristics to a person may need to alter the categories into which he places certain behaviors. The extent to which the mismatch or discrepancy exists between the observed and expected behaviors will affect the amount or degree of change in the observer's view of the person. In general, the more discrepant or unexpected the behavior, the more important it is in changing the person's knowledge about the individual he is observing. The implication, therefore, is that uncommon or unusual behaviors tell more about a person than common behaviors. However, the assumption here is that the uncommon behaviors are characteristic of the person and not just a result of some unusual circumstance not related to his personality. Also assumed within the theory is that, in social interactions, a person continually strives to improve the match between his expectancies and the actions of the person he is observing. The following section relates the above perspectives on understanding to the notion of anticipation.

Understanding and anticipation. Kelly (1955) and DeCharms (1968) have both developed views of understanding that entail anticipation or prediction of the behaviors of others, empirical testing of the predictions, and modifications of understandings when the behaviors observed are discrepant from those predicted. In effect, they have operationally defined understanding as the ability of individuals to predict accurately others' behaviors. In combining this concept of understanding with the need for teachers to understand their pupils, the present study incorporated an operational definition of understanding as a teacher's ability to predict or anticipate accurately responses of the children he is teaching. Due to inextricable semantic ties between the concepts of anticipation and prediction, the two terms will be used synonymously.

In integrating theoretical propositions and observed teacher needs, a model has been developed to elucidate the anticipation cycle in teacher-pupil dyadic interactions. The model is presented in Figure 1. It will be noted from Figure 1 that, when a teacher and pupil interact in an educational setting (A), the teacher acquires certain understandings of the child (B) which lead to anticipations of how the child will behave in learning situations (C). Once the anticipations are formed, they are tested (D) and they can be either unconfirmed (E) or confirmed (F). Confirmed anticipations contribute to the teacher's understanding of the child (B) and positively reinforce the teacher to make further anticipations (H). However, anticipations that are unconfirmed (E) result in greater understandings of the child and the new information is integrated with the previous understandings (G) leading to a revision of anticipations (I) and a subsequent empirical testing of the new anticipations (D).

A practical illustration of the model may assist in demonstrating how the notion of anticipation can contribute to teachers' understandings of pupils. A teacher of educable mentally retarded children has spent the first day of the school year having the students tell about themselves and relate their summer experiences. Among the students in the class is one whose verbal skills surpass those of the other students and one whose verbal skills are among the poorest in the class. The

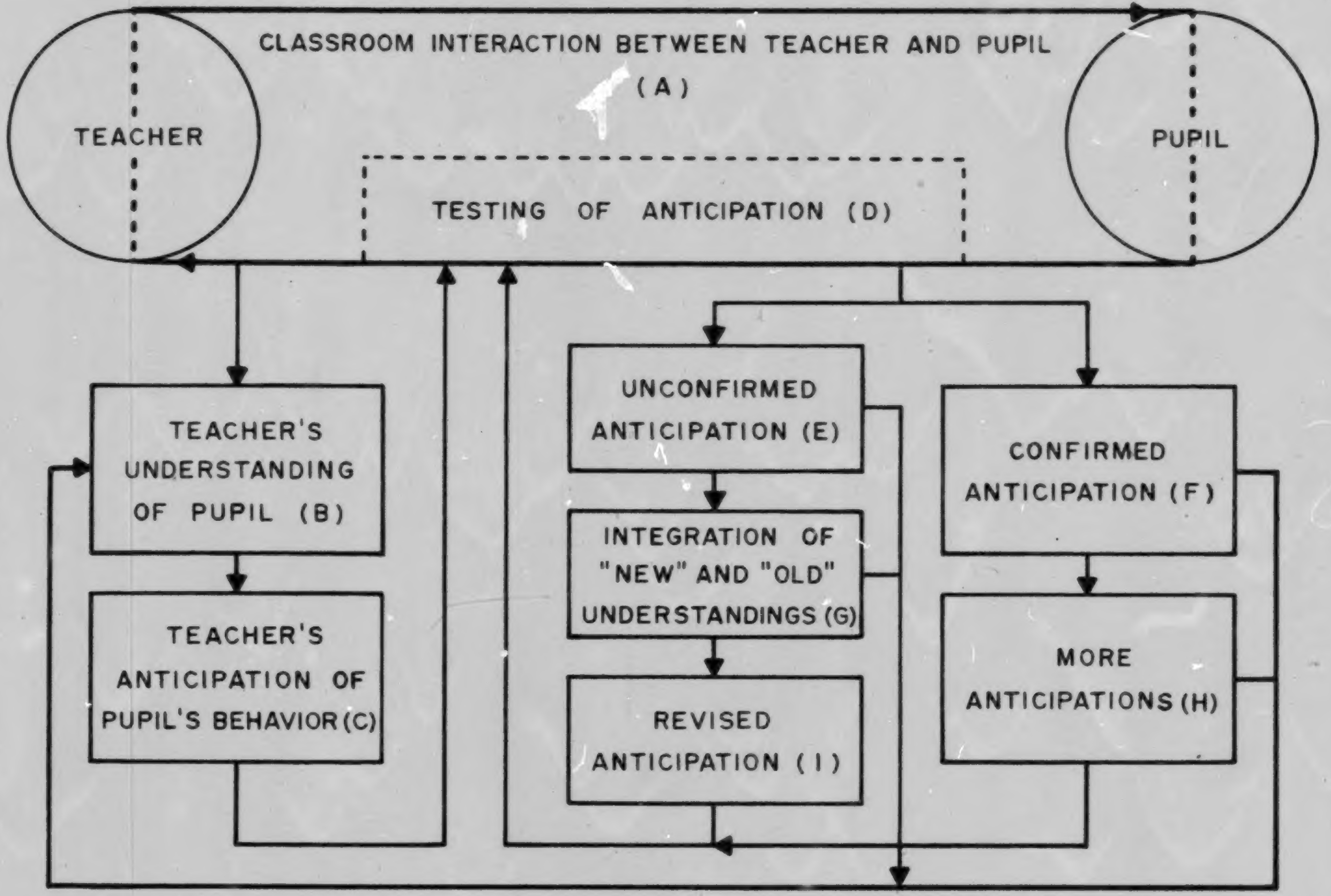
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FIGURE 1. **MODEL OF THE ANTICIPATION** - FEEDBACK CYCLE IN A TEACHER-PUPIL DYADIC INTERACTION

teacher, through interacting with those two students (A in Figure 1, p. 5) on the first day of class has acquired certain understandings of their performances or capabilities (B). On the second day of school he asks the students to complete, in writing, items of personal information such as their names, addresses, phone numbers, and parents' first names. The teacher anticipates that the child who demonstrated superior verbal skills on the previous day will perform at least above average on the written assignment and that the child who demonstrated poor verbal abilities will be at least below average on the writing task. When evaluating the writing assignment (testing the anticipations-D) the teacher notes that, surprisingly, the verbally adept student was considerably below average on the written task, while the verbally incompetent pupil also was among those in the lower half of the class. The lack of confirmation of the first observation (E) results in an integration of the teacher's understanding of the child's relative abilities in speaking and writing (G) and future anticipations regarding the pupil's writing abilities will be revised (I). The anticipations for the pupil with inadequate verbal and writing skills are confirmed (F) and therefore lead to anticipations consistent with the understandings the teacher accrued during the first two days of school (H).

Importance of Anticipation in Education

Teacher's skills in judging the ability of pupils to learn from tasks, to understand explanations, and to solve problems are seen by Gage, et al. (1955, p. 3) as a salient concern in fostering achievement of the cognitive objectives of education. Gage, et al. see teachers who make such judgments accurately as being effective in making assignments, explaining, and leading discussions which are appropriate to their pupil's abilities.

Semmel (1971) posits that teachers can develop specific teaching styles for individual pupils by making accurate anticipations of pupil responses. The contention has also been made that anticipation skill enables teachers to prevent pupil frustration and failure through the expectation of appropriate responses (Thiagarajan, 1971). Remedial instruction and efficient reaction to emergencies are also made possible through exercise of the same anticipation skill. Based on his empirical research, Tyler (1968) contended that teacher judgments appear valuable in group prediction of specific characteristics of children applicable to learning situations. Tyler also felt that, since the predictions seem to withstand time, teacher judgments on specific pupil characteristics should be recognized as a basis for educational decision making.

Thus, teacher anticipation of children's reactions and responses during classroom interactions can be an important facet of a child's educational program. For example, a teacher, upon reviewing a reading lesson for a particular day, might anticipate that one child will be encountering a new word for the first time during that lesson. Anticipation of the potential problem might induce the teacher to develop some remediative strategy contingent upon the pupil's demonstration of difficulty. The child, in turn, could be spared the exposure to failure in front of his peers and would be on his way to making an addition to his vocabulary.

Importance of Anticipation to the Field of Special Education

Although the need for developing skill in anticipating responses of children is relevant to various educational settings, it appears especially related to the field of special education. Semmel (1971) has stated that, "One of the more important aspects of working with handicapped children is to predict deviant responses from pupils, both to prevent their occurrence and to prepare appropriate teaching moves as ameliorative teaching procedures [p. 165]." A primary purpose of special education programs has been seen as the reduction and prevention of a child's exposure to failure experiences. This goal is a reflection of the propensity of exceptional children, when compared to those without handicaps, to respond inappropriately to educational tasks, and thus to have a greater probability of failure. Anticipation of inappropriate responses by teachers might do much to mitigate these undesirable experiences and thereby increase learning efficiency.

Teacher training. Most teacher educators would probably agree that graduates of special education teacher training programs should demonstrate greater understandings of exceptional children than they did upon entering such programs. The various components of special education course-work can be viewed as providing differential input into the understanding of children. Generally, the sequence of experiences begins with basic introductions to the nature and needs of non-handicapped and handicapped children and some theoretical and empirical issues regarding development and learning. Subsequently, programs lead to specific methods of teaching with concomitant observation and participation with exceptional children and, finally, actual teaching in a supervised setting.

Each of a trainee's experiences as he progresses through a program can, and should provide an understanding of children but preservice programs do not necessarily provide these understandings. Semmel (1971) has contended that existing courses in special education frequently provide generalizations about handicapped children. Furthermore, these generalizations often prove inaccurate and misleading when translated into specific classroom behaviors of children falling into one of the traditional disability categories. Sarason, Davidson, and Blatt (1962) have also pointed out that inadequacies in traditional methods courses and experiences provided student teachers have failed to produce teachers who can adapt their behaviors and techniques to the needs and abilities of their pupils. Additionally, Heber (1963), Cain (1964) and others have noted that increased emphasis needs to be placed on concrete aspects of children's functioning in the form of more practicum experiences for aspiring teachers.

Anticipation Training

Limited efforts have been made to train special educators to better understand handicapped pupils through anticipating their responses. Moreover, preliminary investigations have revealed that acquisition of anticipation skills may be a complex phenomenon.

A study of Semmel, Garrett, D. Semmel, and Wilcove (1973) was conducted to determine how accurately different groups of college students could anticipate the most common responses given by EMR and nonretarded children to a set of 25 questions. Data had been gathered previously on the actual responses of 65 EMR and 66 nonretarded children to the set of questions. The selected questions emphasized cognitive processes of the retarded and non-retarded children rather than academic skills or achievement.

Subjects selected for the research study were undergraduates enrolled in courses in educational psychology (N=83), psychology (N=52), special education (N=59), and graduates in special education (N=96). A questionnaire was developed incorporating 24 of the 25 questions along with ten possible responses to each question. These were presented to the subjects whose task was to select the response most frequently chosen by the EMR and nonretarded populations.

The findings revealed that on all variables the subjects anticipated the responses of nonretarded children significantly better than those of EMR children. Female subjects were found to be more accurate anticipators of the responses of EMRs than were male subjects. This relationship did not hold in predictions for the responses of nonretarded children. Students majoring in special education anticipated more accurately than psychology majors and others for pooled populations and for EMRs alone. When the subjects were divided into four age groups of 18 to 24 plus, the 22-23 age group was found to be the least accurate at anticipating for the pooled populations and those in the 24 plus category were most accurate.

The number of credit hours of college course-work the subjects had completed in special education was divided into five groups from

1-13 plus. The 7-9 hours group had scores similar to those with 0 hours; and, for the responses of pooled and EMR populations, all other groups anticipated significantly better than both the 0 and 7-9 hour groups. Individuals with 13 or more hours anticipated most accurately. When divided into four groups ranging from "no experience" to "extensive experience" with EMR children, those with extensive experience anticipated children's responses better than those with no or little experience, and those with moderate experience anticipated better than those with none. Thus, there seemed to be a trend indicating that increased experience with EMR children leads to better anticipation for pooled responses and EMR responses. No differences were found between the anticipation abilities of those subjects in graduate special education courses and those in undergraduate education courses, although subjects from special education graduate and undergraduate courses had the highest anticipation scores. Undergraduates in education courses performed better than undergraduates in psychology, and students in special education performed better than those in educational psychology. No differences were found between performances of undergraduates and graduates in special education.

Findings such as these point out the complexity of anticipation processes. This, in turn, emphasizes the need for further investigating anticipation and its potential for training and for developing methods whereby the accuracy of anticipations can be increased.

Watley (1966), in analyzing the functions of counselors, felt that, since counselors and individuals in other roles do make various kinds of predictions, more attention should be paid to finding methods of teaching these individuals to increase the accuracy of their predictions. Thomas and Mayo (1957), Oskamp (1961), Newton (1965), Imig (1966), and others have found increased accuracy of clinical prediction following training. Imig (1966) feels that item by item experience with data, along with immediate feedback, is the most promising technique for improvement of clinical prediction. The results of Oskamp's (1961) study led him to suggest that, "techniques of specific training and immediate feedback may be profitably used to speed the accumulation of internal norms [p. 3528]." Most of the above studies employed both experienced and naive subjects and utilized delayed feedback in the form of corrective procedures applied after a series of predictions had been made. One study (Imig, Krauskopf & Williams, 1967) succeeded in increasing accuracy of clinical prediction through the use of immediate feedback training.

Anticipation Games

Games and simulations have been widely employed in developing specific skills in teachers (Kersh, 1965; Cruickshank, 1966; Broadbent, 1967; Twelker, 1967; Wood & Hedley, 1968). The value of games as motivational devices for learning attainable goals has been demonstrated in a number of settings (Cherryholmes, 1966; Boocock & Coleman, 1966; Abt, 1970; and others). Game construction and format also provide the advantage of demanding specificity of content and clarity of procedures.

Based on the observed relationship between anticipation and understanding of pupils and the potential for training anticipation or prediction skills, a series of games have been developed at the Center for Innovation in Teaching the Handicapped at Indiana University. These are called Anticipation Games (Semmel, 1971) in that they require that individuals anticipate or predict the responses of groups of children to various tasks. Once the players have anticipated the extent to which certain behaviors or responses appear in the population of pupils specified, they are provided immediate feedback based on empirically obtained normative data that shows which player has most closely approximated the correct response. As Thiagarajan (1971) has pointed out, the salient instructional strength of the game lies in the fact that the success of the player depends not upon expert opinion nor upon generalizations about handicapped children, but upon empirical data. In this way, the feedback to the player is as realistic as the feedback to the classroom teacher. The player, however, has the advantage of experiencing a number of anticipation-feedback cycles in a relatively short period of time. The results of one pilot study (Semmel & Sivasailam, 1971) indicated that Anticipation Games (Semmel, 1971) can be employed as a training method when anticipation skills were found to increase as a function of playing the games.

Purposes of the Study

A primary purpose of the present study was to demonstrate that teachers can increase their understanding of retarded children as a function of playing a game designed to increase anticipation skills. A second major purpose was to determine whether or not the skills obtained in the game setting transferred to teacher classroom behavior.

The study was comprised of two developmental and two evaluative phases. The acquisition of a body of normative data on educable mentally retarded (EMR) children and the design and construction of a new anticipation game constituted the developmental components. The two evaluation aspects involved assessing the anticipation efficiency of teachers as they acquired experience in playing the game, then evaluating their anticipations of the responses of randomly selected children in their own classes. To the writer's knowledge, the present work is the first attempt to assess the effects of teacher classroom-related anticipations following anticipation training. A review of literature pertinent to anticipation training using a game format is presented in the following chapter.

CHAPTER II

REVIEW OF THE LITERATURE

The present study attempted to increase teachers' skills in anticipating responses of retarded children and to assess the transfer of those skills to teacher classroom performance. The rationale for the study was presented in the previous chapter. The present chapter will relate observations and findings from the literature relevant to the problem under investigation. Literature dealing with the notion of anticipation will be considered first and will be followed by a review concerned with gaming and simulation in educational settings. Finally, research on anticipation games--including their relevance to the generation of hypotheses for the present study--will be reviewed.

Anticipation

The literature perused on anticipation varies widely in its foci. The areas to be analyzed in the present section are: (1) anticipation in noneducational settings and, (2) anticipation in educational settings with emphasis on studies of sociometric status, studies of reading performance, and other studies of anticipation in education. The subsequent areas discussed in this chapter will deal with anticipation as related to: (1) pupil IQ; (2) experience; (3) training; and (4) individual characteristics of anticipators.

Anticipation in Noneducational Settings

Studies to be considered in this section center around the longstanding controversy regarding the relative merits of clinical and statistical or actuarial prediction. The former concerns prognoses or predictions based on more or less subjective assessments by a clinician (i.e., a clinical psychologist or counselor), although these assessments may incorporate various types of "hard" data. The latter type of prediction implies more objective means of assessment through the use of means such as combined scores of standardized personality measures. Imig, Krauskopf, and Williams (1967) point out that the preponderance of studies either found no differences between the two methods of prediction or were inconclusive. They suggest that perhaps there is need for a careful and systematic investigation of the mechanics of prediction itself.

Holt (1970) contends that the impression of most psychologists is that clinical prediction has failed to match the achievements of statistical prediction. He also states, however, that psychometricians and others involved in statistical types of prediction tend to downgrade the importance of understanding as a scientific goal. In support of this contention, he mentions that the logic of statistical prediction does not require understanding of the behavior in question. The interest of statisticians ceases, according to Holt, once they have shown that some measurable predictive variables are correlated with the criterion. However, it is precisely at this point that the psychologist should become curious and begin the investigation of the reasons behind the observed regularity. Holt also emphasizes that prediction should be viewed as a scientific means, and not as an end in itself. Analysis of this view from an educational standpoint highlights the need to examine prediction as a means of initiating educational interventions.

In comparing clinical and actuarial methods of prediction, Melton (1953) evaluated the relative prediction accuracy of different clinicians. The study involved several groups of counselors and personnel workers at the University of Minnesota who made predictions of academic success of several types of students entering the College of Arts and Sciences. One hypothesis (out of many) tested, revealed that in one out of three experiments, significant differences between the prediction accuracies of counselors were found. Melton also found that the clinical predictions obtained were more often overestimates than underestimates.

In a study conducted in a summer camp, Newstetter, Feldstein, and Newcomb (1938) asked six counselors to make judgments concerning the sociometric status of 30 14-year-old boys who had been allotted five choices each for tentmate preference. The counselors rated the boys on a seven-point scale for sociometric status with a resulting mean correlation coefficient between the counselors' predictions and the boys' choices of .756. The small number of counselor-judges and the usual counselor-camper closeness in a camp setting tend to preclude generalizing this relationship in other situations.

Oskamp (1961) employed 44 clinical psychologists and 28 undergraduate psychology majors as judges in his study. The experimental task was to judge 200 Minnesota Multiphasic Personality Inventory profiles of carefully screened and matched patients in order to determine the etiological bases of hospitalization. Half of the patients were hospitalized for psychiatric reasons and half were hospitalized for medical reasons. The results indicated that prediction accuracy of all clinicians significantly exceeded a chance level.

These studies, although not specifically related to teacher-pupil interactions, support the notion that prediction is a phenomenon requiring investigation (Imig, Krauskopf, & Williams, 1967), that it can lead to increased understandings (Holt, 1970), and that individuals make differential predictions (Melton, 1953). Furthermore, it may be possible to predict how others will respond (Newstetter, Feldstein, & Newcomb, 1938) as well as judge the status of individuals based on certain items of information (Oskamp, 1961). The next section deals with literature concerning anticipation within educational settings.

Anticipation in Educational Settings

The studies included in this section are those concerned with teacher judgments or predictions of children's behaviors or abilities prior to the assessment of the children or when the teachers were unaware of those behaviors or abilities. Inasmuch as there have been several studies conducted both on teacher prediction of the sociometric status of pupils and of pupil reading performances, these areas will be treated separately in the first two parts of this section and will be followed by a review of other anticipation studies in educational settings.

Studies of sociometric status.

Moreno (1934) asked teachers of the first eight grades in a Brooklyn school to judge which boy and girl would receive most of the choices from their classmates as the pupil they favored most and which two would receive the next most as evidenced in a sociometric test. He also asked them to judge which two would receive the least choices and which two the next least. The findings revealed that 48 percent of the teachers' judgments coincided with the with the test findings for the two most-chosen boys and girls and 38 percent of the predictions for the least-chosen boys and girls in the teachers' classrooms.

In conducting a sociometric study of a fifth grade, Bonney (1943) had three teachers, at the end of the year, make judgments concerning their pupils' sociometric status. They were asked to place the pupils in five categories--highest, above average, about average, below average, and lowest. They were not required to place the same number in each group. Comparing the teacher groupings with the sociometric results, Bonney found that, "approximately ninety percent of the children were placed by the teachers, either in the same quintile, or only one removed from that in which they were placed by pupil choices." This finding, however, is undramatic considering the small number of subjects and the fact that a teacher could select one out of three quintiles and still have his prediction included in the 90 percent.

Gronlund (1950) stated the accuracy of teachers' judgments concerning the sociometric status (acceptance of classmates as determined by a sociometric test) of sixth-grade pupils. The sociometric test was administered to 1,258 pupils in 40 sixth-grade classes and each of the 40 teachers made judgments concerning the sociometric status of the pupils. It was found that there were differences in the accuracy of teachers' judgments (correlation coefficients ranged from .268 to .838) and that teachers were relatively accurate in their predictions indicated by a mean correlation coefficient of .595. No differences were found in the accuracy of judgments for boys and girls.

An investigation which, in part, concerned the ability of elementary teachers to predict the self-concept and sociometric status of pupils in their classes was carried out by Smith (1969). Forty-five teachers and their students in grades four, five, and six constituted the study sample. The results revealed the average participating teacher was capable of making predictions about pupils at an accuracy rate of 53 percent--only slightly better than would be expected by chance.

As part of a more extensive study, Gage, Leavitt, and Stone (1955) assessed teachers' understandings of the "social aspects of pupils" by examining teachers' awareness of the sociometric structure of their classes. The 103 fourth-, fifth-, and sixth-grade teachers in the study were asked to predict which two children each of their pupils would prefer to have in the same section if the class were to be split into two sections. Evaluation of the overall accuracy was accomplished by counting the number of choices the teacher predicted each pupil would receive and correlating that figure against the number each pupil actually did receive. The mean correlational accuracy score was .48, indicating that the teachers had considerably better than chance success in judging the relative sociometric status of their pupils.

In summary, of the five studies reviewed on teachers' predictions of the sociometric status of pupils, the results of three were questionable or revealed that teachers predict accurately about 50 percent of the time or less (Moreno, 1934; Bonney, 1943; and Smith, 1969). The remaining two studies (Gronlund, 1950; Gage, Leavitt, & Stone, 1955) did demonstrate significant correlations between teacher predictions and pupil performances, indicating that many teachers in their studies were able to make accurate predictions. Few conclusions can be reached due to the fact that each study examined the sociometric status of different numbers of pupils and predictions of different status groups within classes (i.e., highest status or highest and lowest status groups). However, the variability of the above findings does suggest the need for more controlled research on the nature of anticipation and variables involved in anticipating sociometric status to determine whether teachers are adept or can become more adept at predicting this phenomenon. Studies in the succeeding section deal with teachers' anticipactions of the reading performances of children.

Studies of reading performance. Research on teachers' predictions of pupil reading performances have been conducted primarily with kindergarten teachers (Lee, Clark, & Lee, 1934; Mattick, 1963; Thackray, 1965; Ewing, 1967; and Tyler, 1968) and with first-grade teachers (Carr & Michaels, 1941; Kottmeyer, 1947; Henig, 1949; Tyler, 1968; and Zaruba, 1968). Kottmeyer (1947) and Ewing (1967) assessed predictions of reading readiness while other investigators were concerned with anticipations of reading performances.

Most of the studies examined teacher judgments of how pupils will perform in their next grade. However, a few studies (i.e., Carr & Michaels, 1941; and Henig, 1949) obtained baseline data (teachers' judgments) on pupils' potentials for achievement in reading and then assessed actual pupil performances later in the same academic year. This technique is methodologically unsound inasmuch as the teachers may have been consciously or unconsciously fulfilling their own prophecies in their classroom instruction during the year. Also, when the criterion measure was reading achievement assessed sometime during a subsequent grade, no studies attempted to equate teaching styles or abilities among teachers of the pupils for whom predictions had been made. Thus, differential reading instruction performance by teachers may have contributed inordinately to support or refute the predictions made earlier.

As a part of a larger study, Kottmeyer (1947) compared teachers' judgments of pupil readiness with estimates obtained from readiness tests. In this extensive study, 142 first-grade teachers made estimates of 3,156 children's readiness for reading. Their assessment of readiness or lack of readiness was counted as accurate or inaccurate if the child made an average score above or below 1.58 on the Gates Primary Reading Tests. The percentage accuracy of prediction was 71.4 for the 142 teachers.

In comparing the forecasting value of the Lee-Clark Reading Readiness Test with teachers' estimates of their pupils' likelihood of succeeding in learning to read, Henig (1949) used a sample of 98 beginning first-grade children. His findings revealed a correlation coefficient of .59 between the predictions of teachers and the children's reading achievement during first grade. One of Henig's conclusions was that, as far as the subjects were concerned, their first-grade teachers were just as successful in predicting the degree of success of their students in learning to read as was the standardized reading readiness test. Thus, the above two studies support, to some degree, teachers' potentials for making accurate predictions of pupil readiness for reading.

In the development of a rating scale to predict achievement in kindergarten, Ewing (1967) employed a sample of 515 children entering kindergarten. He obtained a correlation coefficient of .591 between the teachers' predictions and the Metropolitan Reading Readiness Test, the final criterion measure.

An early study by Lee, Clark, and Lee (1934) involved the development and testing of a rating scale for prediction of reading success by kindergarten teachers. A correlation of .45 was found between the total scores on the items in the rating scale with success in reading. Interestingly, the authors felt that one of their most important findings was the vast differences in the predictive abilities of various teachers in their rating and ranking of children (teachers had to rank order the children according to predictions of reading ability). They point out that some of the teachers' understandings of the abilities and limitations of their pupils far surpass any that could be obtained from a test or a group of tests. At the same time, however, some teachers seem to know little or nothing about their pupils' potentialities.

Carr and Michaels (1941) compared the rank ordering by first-grade teachers of their pupils after two months of informal study to pupil performances on the Gates Primary Reading Tests administered several months later. The obtained correlation coefficients between teacher predictions and the criterion measures ranged from .64 to .94 with a mean coefficient of .79. The authors conclude that, "It seems, then, that the average estimate of these teachers, for the purposes of relative ranking, is about as good as the best prediction obtained with readiness-to-read tests [Carr & Michaels, 1941, p. 137]." The findings of this study, although dramatic, must be viewed with considerable caution as they may have been influenced by a "self-fulfilling prophecy" which was discussed above.

Studies by Mattick (1968) and Zaruba (1968) both incorporated appraisals by teachers who assigned "high," "average," or "low" ratings to students in regard to their potential for reading success. Mattick found that the correlation of .43 between kindergarten and first grade teachers' ratings was superior to that obtained by three of the four standardized instruments used. The results of Zaruba's investigation indicated that of the children receiving "high" teacher assessments, 78 percent scored "high" on the Stanford Achievement Test and none of those rated "high" scored "low" on the Stanford Tests. On the basis of her findings, Zaruba concluded that, "careful teacher appraisal, based on multiple data, is a valuable tool for evaluating young children's reading readiness and achievement [p. 54]."

Employing a representative sample of 182 children from 11 schools, Thackray (1965) compared a number of measures of reading readiness to later reading achievement. Three of the measures were teacher ratings of general ability, language, and speech. When tested one year after the children were rated by their teachers with the Southgate Group Reading Test, the correlation of the ratings with general ability was .52, with language, .47, and with speech, .41. All of these findings were significant at the .01 level of confidence.

In reviewing the findings of the above studies of reading performance in relation to the present investigation, the salient implication is that teachers are capable of reliably predicting pupil performances. Table 1 presents the studies reviewed with the year in which the study was reported, the grade teachers had when they made their anticipations, and the findings of the study either in the form of a correlation coefficient between teachers' predictions and the criterion measure or the percentage of prediction accuracy.

The variability of teacher performances in predicting reading skill as noted by Lee, Clark, and Lee (1934) emphasizes the need for developing methods whereby the prediction abilities of those teachers not adept at anticipating can be enhanced. It is important to realize that the studies on anticipation of reading performances assessed predictions of a global capacity, whereas the present study attempted to assess teacher predictions of specific responses. Although it is beyond the scope of the current study, an interesting question concerns whether teachers who are good anticipators of global abilities of children (i.e., reading competence) are also good predictors of specific responses. The following section presents anticipation studies in educational settings which, due to their variability, were not grouped according to any criterion.

Other anticipation studies. The studies described below did not fall into any of the logical clusters reviewed earlier in this chapter and, thus, have been treated individually. Table 2, presented on page 27, presents a listing of the studies reviewed in this section along with the year the study was conducted, the group predicting, the grade level of pupils for whom predictions were made, and the principal

Table 1

Studies of Teacher Anticipation

of Pupil Reading Performance

Investigator	Year	Grade	Correlation of Teachers' Predictions with Criterion	Teachers' Prediction Percentage Accuracy
Lee, Clark, & Lee	1934	Kindergarten	.45	
Carr & Michaels	1941	First	.79	
Kottmeyer	1947	First		71.4
Henig	1949	First	.59	
Zaruba	1968	First		78.0 (approx.)
Mattick	1963	Kindergarten	.43	
Thackray	1965	Kindergarten	.52	
Ewing	1967	Kindergarten	.59	

Table 2

Anticipation Studies in Educational Settings

Investigator	Year	Group Predicting	Students	Principal Findings
Gage and Suci	1951	Teachers	High school students	No significant differences between teacher predictions and pupil ratings of teachers
Gage, Leavitt, and Stone	1955	Teachers	4th, 5th, & 6th graders	Pupil problems were predicted with significantly better than chance accuracy
Watley	1966	Counselors	College freshmen	Significant difference among prediction abilities of one group of high school and two groups of college counselors
Van Riper	1968	Counselors, Teachers, & Principals	9th graders	Counselors were no better in predicting than were teachers and principals nor more variable than teachers
Hanna, Bligh, Lenke, and Orleans	1969	Teachers	8th graders	Predictions were significantly related to pupils' algebra grades but were less accurate than an algebra prognosis test or developmental IQs
Amble	1970	Teachers	High School Graduates & Dropouts	Significant difference in teacher ratings on all categories of behavior

findings of the studies.

Van Riper (1968) studied the predictions made by teachers, principals and counselors and the responses made by ninth-grade students to environmental situations in junior high school. He was attempting to evaluate the acquired ability of school counselors to predict student perceptions. The rationale for the study assumed that those who met the largest number of individual students in nonauthoritarian contacts would make the most accurate predictions of students' perceptual responses. Sample sizes used in the study for students, teachers, principals (and/or assistant principals), and counselors were 735, 53, 26, and 30 respectively. Statistical analyses indicated that counselors were no better than teachers (or principals) in their predictions of student perceptual responses nor were they more variable than teachers. The implication that can be drawn from this study is that professionals, other than teachers, who work in education settings would probably benefit as much from anticipation training as would teachers.

A study by Gage and Suci (1951) engaged 20 high school teachers in predicting percentages of the 200 pupils in their school who would respond affirmatively to a set of 67 opinion items. Their purpose was to determine whether or not teachers who perceived their pupils' attitudes more accurately than did other teachers would be regarded more favorably by those pupils. Following the students' responses, the percentage of "yes" responses was found for each item. Each teacher was scored by taking the percentage for each item, summing and averaging across all items disregarding the signs of the differences.

Students then rated their teachers on a 52-item questionnaire, and the correlation between the mean student ratings and the mean error scores was -.37 which, although not significant, was in the direction inferred from the hypothesis: the greater the teacher's mean error in estimating student opinion, the lower his mean rating by students. In spite of their relatively small sample and the fact that the study was confined to one school, the authors tentatively conclude, "that teachers' accuracy of social perception is positively related to their effectiveness in eliciting positive affect in pupils [p. 152]."

The importance of the Gage and Suci (1951) study to the present work is that having teachers make predictions in the form of percentages was shown to be a viable means of eliciting anticipations. However, one factor with which the authors do not deal and which could have affected the findings of the study is the temporal sequence between the administration of the 67-item pupil opinionnaire and having the teachers predict for the 67 items. If the teachers had predicted prior to the administration of the instrument to the students, the percentages obtained would be of questionable validity. Thus the possible invalidation of predictions would have occurred if the teachers had consciously or unconsciously asked the students about their attitudes in order to get feedback about their own prediction accuracies.

Amble (1970) conducted a study to determine if, in teachers' relationships with their students, teachers would be able to identify future school dropouts on certain behavioral traits. The rationale was that such predictions could facilitate the establishment of special procedures and remedial educational programs that might influence the students to complete school. This rationale is consistent with the earlier noted concerns of Semmel (1971), Thiagarajan (1971), and Holt (1970), who view prediction as a means of initiating interventions. The design incorporated two groups of students: one graduating after four years of high school (N=50) and one whose members left school prematurely (N=46). Both groups were constituted from a population of students entering the ninth-grade during a two year period.

Ratings were obtained on the subjects from 506 teachers in seven areas of behavior. The results showed significant effects for teacher evaluations on all seven behavior traits favoring the graduates. The level of significance was less than .001 on all of the behavior areas except one where it was less than .01. Thus, without exception, the graduates were rated relatively more often in the favorable categories while the dropouts were rated a disproportionate number of times in the disapproval categories. In the analyses, the data on males, when compared to parallel trends for females, showed the greatest differences. In conclusion, Amble (1967) stated that the findings "strongly suggest that teacher evaluations of student behavior as favorable or unfavorable are tantamount to predicting how a student experiences the school program [p. 410]."

In a study investigating the prediction of achievement in algebra, Hanna, Bligh, Lenke, and Orleans (1969) looked at teacher prediction along with an algebra prognosis test, student IQs, and mathematics grades. The initial sample consisted of 1,105 eighth-grade mathematics students in nine schools in six states who took the Orleans-Hanna Algebra Prognosis Test in April and May of 1967. As part of the study, eighth-grade mathematics teachers predicted the mid-year grade each student would receive in algebra if he were to take the subject. It was found that teacher predictions were significantly ($\underline{p} < .05$) correlated with mid-year grades with three (out of three) stepwise regression analyses, with year-end grades in three (out of three) analyses, and with year-end algebra test performances on the second two (out of three) stepwise regression analyses. However, the teacher predictions were less accurate predictors than both the algebra prognosis test and developmental IQs. Amble concluded that the use of teacher predictions may be less productive in predicting grades with tests that incorporate student-reported past grades into their total score than with more conventional special-purpose prognostic tests.

Another phase of the Gage, Leavitt, and Stone (1955) study concerned the measurement of teachers' sensitivity to pupils' problems. The subjects were 103 fourth-, fifth-, and sixth-grade pupils in 19 elementary schools in a midwestern city. In carrying out the study, Gage, et al. developed 12 sets of three-problem check list items equated for prevalence in a national sample. The pupils were asked to rank the three items in each set according to how much each "worried or bothered" them. Each teacher was then asked to predict the problem-ranking responses of the two boys and girls in their class who were "easiest to work with" and two boys and girls who were "most difficult to work with." The teachers' accuracy scores were the mean (over the eight children) of the sum of the squared deviations of his or her predictions from the children's own responses. The mean scores could range from 0 (perfect accuracy) to 96 with a chance score being 48. The mean of the means was 43.5 revealing that the teachers, on the average, predicted their pupils' responses with significantly better than chance accuracy, but the average level of accuracy in predicting the rank order of three problems was quite low.

Watley (1966) initiated a study to assess counselor variability in different educational settings. He also attempted to identify factors that differentiated between counselors who predicted with the "most" and the "least" accuracy. Watley employed 66 counselor judges: 12 from a university student counseling bureau, 14 from the art college at the same university, and 40 high school counselors. All judges predicted for 100 freshman students. Comparisons were made between the number of "hits" (a correct dichotomized prediction for a student to earn a GPA of "C or higher" or "less than C" based upon grades actually earned) obtained by the three groups of counselors. The findings revealed that there were significant ($\underline{p} < .01$) differences between counselor groups in their abilities to predict academic achievement.

In summary, the above studies have resulted in contradictory findings making generalizations difficult. They have revealed that some teachers are able to predict student behaviors and responses accurately (Gage, Leavitt, & Stone, 1955; Hanna, et al., 1969; and Amble, 1970). However, there is variability between individual prediction performances (Watley, 1966), and teachers in one study (Van Riper, 1968) were no more adept at anticipating than were counselors or principals. It has also been shown that students appraise more positively (although not significantly so) those teachers who are more accurate in predicting student behaviors (Gage & Suci, 1951). These findings reinforce the need for closely examining prediction skills of educators and for determining if such skills are amenable to development through intervention.

Anticipation and Pupil IQ. The following studies are relevant to the present work in that teachers in the current study, both in their training and their responses on the criterion measure, were required to make anticipations for groups of pupils with differing IQs. A study examining kindergarten and first-grade teacher judgments on selected learner characteristics in forecasting reading success of children in grade four was carried out by Tyler (1968). It was found that teachers' judgments were significantly correlated with pupil mental maturity for both kindergarten and first-grade teachers.

An investigation of the ability of elementary school teachers to discriminate among their students on relevant personality variables and the relationship of teachers' ratings to students' IQ scores was conducted by Barnard, Zimbardo, and Sarason (1968). The subjects were four groups of second-and third-grade school children (n=96) who varied in their IQ status and test anxiety status (high or low) as determined by two standardized tests. They were rated by their teachers on a series of 24 personality and school performance characteristics.

Although the findings revealed that the teachers did not differentiate in their ratings between low-anxiety and high-anxiety children on any of the 24 traits, they were able to discriminate on the basis of IQ. On 14 of the 24 traits, students with high IQs were characterized differently from those with low IQs ($p < .05$). Over the combined teacher ratings the difference between high-IQ and low-IQ subjects was highly significant ($p < .001$) with most of the desirable characteristics being attributed to the high IQ children. Thus, it was concluded that the child with a high IQ tends to be perceived, relative to a child with a low IQ, as one who learns quickly, pays attention, retains material, overachieves and is ambitious. Barnard, et al. then provide evidence in support of the position that the evaluations obtained reflected, at least in part, the biases of the teacher raters rather than simply actual behavioral differences of the children. This observation confirms the need for teachers to test their specific anticipations in classroom interaction with pupils so that their more fundamental expectations do not influence their behaviors.

A group of early studies assessing the accuracy of teachers' estimates of pupil IQ were carried out by Garrison and Tippett (1922), Averill (1923), Varner (1923), Morrison (1924), Pressy and Long (1924), and Hubbard and Flesher (1953). The mean correlation coefficient for the six studies was .58 indicating that teachers are able to make valid estimates of the IQ of their pupils.

Semmel and Sivasailam (1971), in their pilot validation study assessing the Anticipation Games (Semmel, 1971), found that anticipation accuracy increased most rapidly for normal pupils and second most rapidly for pupils with IQs ranging between 50 and 64, and that accuracy increased at the slowest rate for the 65 to 80 IQ group. Semmel, Garret, D. Semmel, and Wilcove (1973) supported, in part, the above finding when they revealed that subjects anticipated responses significantly better for nonretarded than for retarded children.

In summary, the above studies show that teachers do make differential judgments or anticipations for groups of children in the differing IQs. Perhaps, as Barnard, et al. (1968) posit, these differential judgments are more a reflection of teacher biases than of accurate teacher assessment of pupil behaviors implying the need for more objective anticipations by teachers.

Anticipation and Experience

Gronlund (1950) carried out a sociometric status study which revealed no relationship between the accuracy of teachers' judgments and their years of teaching experience or their length of time in their present position. However, Kottmeyer's (1947) study revealed a positive relationship between accuracy of teachers' predictions of reading ability and amount of teaching experience. He found that teachers with less than five years of experience obtained an accuracy percentage of 64.5; those with five to ten years of experience obtained a 71% prediction accuracy, and teachers with more than ten years of experience made accurate predictions 77% of the time. Melton (1953), in a study comparing clinical and actuarial methods of prediction, found that experienced counselors were more accurate predictors than were inexperienced counselors, but the differences were not significant. Oskamp (1961), in his study of judgments of medically- or psychiatrically-hospitalized patients, found a significant positive relationship between experience and prediction accuracy. Gage, et al. (1955) also found a positive relationship between experience and predictions when they demonstrated that teachers were significantly better than teacher trainees in judging the difficulty of achievement test items for pupils. Imig (1966) found that prior professional experience and training were not related to accuracy in prediction. When examining the influence of prior teaching experience on prediction abilities, Tyler (1968) found no significant relationship between the two variables, but Smith (1969), interestingly, found a negative relationship between experience and prediction abilities with a tendency for high predicting teachers to be younger and less experienced than low predictors. Following assessment of prediction abilities by counselors, Watley (1966) divided the subjects into "high" efficiency and "low" efficiency groups, but no differences were found between these groups in the amount of counseling experience accrued. The inconsistencies and contradictions in the above research preclude any conclusive statements regarding the relationship between anticipation or prediction and experience. Moreover, the findings which indicate increased prediction accuracy with length of service may be due to attrition of those who are unable to teach. A comprehensive investigation would entail obtaining prediction data on teachers or counselors who have dropped out of teaching. When hypothesizing a significant correlation between experience and anticipation skills, no statement was made in regard to the direction of the hypothesis.

Anticipation and Training

Oskamp (1961), in a study cited earlier, reported improvement in prediction abilities following training, as did Newton (1965) in an investigation in which subjects estimated college students' grade averages from four-sentence descriptions both in naive states and following feedback. A study of the effect of feedback on improvement of accuracy in clinical prediction was also conducted by Imig (1966). In this investigation two training sessions with pre- and posttests were presented to 33 undergraduate students and 14 professional counselors. The 150 training items consisted of the high school rank and SCAT T-scores of entering freshmen. Feedback was whether or not the freshmen obtained a successful first year grade point average. The subjects were told only that the two bits of information were given them and they were to decide whether the student passed or failed the first year of college. The results indicated a significant increase in their mean number of correct predictions after training. However, pretest accuracy did not correlate highly with posttest accuracy or learning.

Thomas and Mayo (1957) attempted to increase the accuracy of prediction by vocational counselors through the application of knowledge of results. The first step was the accumulation of 1,315 predictions by counselors regarding the degree of success that each of their counselees (U.S. Marine Corps aviation technicians) would have in the training course leading to the occupation selected. For each training course, the counselors received, in a nonthreatening manner, information concerning the number of correct predictions, and the direction and magnitude of the errors they had made. In the second phase of the study, an additional 1,647 predictions were obtained and the accuracy of these predictions was compared with the accuracy of those that had been followed by knowledge of results. The percentages of correct predictions increased significantly ($p < .001$) from 31.9 before knowledge of results to 42.9 after knowledge of results, indicating that this treatment was effective in increasing the prediction accuracy of these counselors.

The pilot study by Semmel and Sivasailam (1971) of the Anticipation Games (Semmel, 1971) found the player increased his anticipation skill as a result of continuous playing of the game, indicating a training effect provided through the game format. Thus, the conclusion that can be reached from the above studies is that it is possible to increase anticipation skills through interventions, and such increases have been demonstrated in a variety of educational settings.

Anticipation and Individual Characteristics of Anticipators

In his study of teachers' judgments of sociometric status, Gronlund (1950) found no relationship between accuracy of judgments and each of the following variables: age of the teacher, semester hours of college training, recency of college training, years of teaching experience, length of time in the present position, semester hours in education courses, semester hours in psychology courses, size of class, marital status of the teacher, and length of time the teacher has been in contact with the class. A positive relationship was found between taking a child development course and accuracy of judgments, and there was a tendency for teachers to over judge the sociometric status of pupils they most preferred and to under judge the status of those they least preferred.

Smith (1969) found that those teachers who were more accurate in their predictions were more other-person oriented and more responsible than were low-predicting teachers exceeding the .05 and .01 levels of significance respectively. There also were slight tendencies for high-predicting teachers to be more democratic, open, and affiliative than were low predictors.

As part of the Gage, Leavitt, and Stone (1955) study, the three kinds of teacher understanding assessed (discussed above) were related to the teachers' sex, ages, grades taught, and attitudes toward pupils and teacher-pupil relationships (Minnesota Teacher Attitude Inventory). Male teachers were found to be significantly ($p < .05$) less accurate than female teachers on the cognitive aspects test, but the differences on the other two accuracy scores were not significant. The correlations of the three accuracy scores with the teachers' ages and with 80 teachers' scores on the Minnesota Teacher Attitude Inventory were all essentially zero. Fourth-grade teachers were more accurate than fifth- and sixth-grade teachers on the cognitive aspects measure with the differences between the fourth- and sixth-grade teachers being significant at the .05 level. In contrast, teachers of fifth- and sixth-grade classes were more accurate ($p < .05$) in predicting interpupil preferences. The lack of consistent findings and the small number of studies examining teacher characteristics in relation to anticipation or prediction skills makes conclusions infeasible pending further research.

Simulation and Gaming

Although the terms "simulation" and "gaming" are often used interchangeably, and simulation is often subsumed under the rubric of games or gaming, the terms will first be considered here as entities. The general development and use of games and simulation games as they pertain to education will then be described. A description of research involving educational applications of simulation and gaming will follow, and, concomitantly, its implications for and relevance to research pertaining to the training of teachers.

The first treatment will concern the notion of gaming. According [illegible] Abt (1970) a game, when reduced to its formal essence, "is an *activity* among two or more independent *decision makers* seeking to achieve their *objectives* in some limiting context [p. 6]." Coleman (1966) feels that nearly any game, and not just those termed "simulation games," is a form of caricature of social life. He believes that games are a magnification of some aspect of social interaction from its social context and that they give it a special context of its own. Coleman (1967) defines games as "a special intervention in which children or adults practice with the components of life itself, a kind of play within the larger play of life itself [pp. 20 and 21]."

Shubik (1971) has suggested six main divisions of the goals of gaming. These are: (1) teaching, (2) experimentation, (3) entertainment, (4) therapy and diagnosis, (5) operations, and (6) training. He provides a further breakdown of the categories of teaching and training, and these will be discussed below in considering the applications of gaming and simulation to education.

The literature perused on simulation has revealed varied conceptions and definitions. Barton (1970) defines simulation as the dynamic execution or manipulation of a model of an object system for some purpose (p. 6). Twelker (1968) reviewed a number of definitions of simulation and found that definitions generally described either a process or a product. The former term implies a simulation in which the individual is "doing" an activity such as constructing, manipulating, or representing. The view of simulation as a product involves, on the other hand, something which is more or less tangible, such as a game or a model. Here the distinction is basically between simulation as an act and simulation as an entity. In the first instance, the techniques or means involved in simulation are inherent and important in its meanings, while in the second, the end product of the simulation is emphasized. This distinction can be illustrated by a boy operating a model boat in contrast to the model itself (Twelker, 1968).

Harman's (1961) review of some definitions of simulation stated that all the definitions have in common the characteristics of substituting other elements for some or all of the real elements of the system. D. Cruickshank (1966) has defined simulation as, "the creation of realistic games to be played by participants in order to provide them with lifelike problem-solving experiences related to their present or future work [p. 23]."

Twelker (1968), when summarizing his review of definitions and conceptions of simulation, pointed out that simulation may be thought of in general terms as: (1) a technique of modeling (physically, iconically, verbally, or mathematically) some aspects of a real or proposed system, process, or environment or (2) the model (physical, iconic, verbal, or mathematical) of some aspects of a real or proposed system, process, or environment. The usage adopted by an individual would be largely dependent upon his particular discipline and the use to which the simulation is put. Twelker also sees three primary uses of simulation: (1) research--the generation of information about an operation or proposed system, processes, or environment, (2) development--the generation of new systems, processes, or components, and (3) instruction--the development of knowledge or skills. According to Thoeny and Horton (1970), there are three primary purposes of simulation which are comparable to those of Twelker (1968): (1) to teach, (2) to train, or (3) to contribute to research. Coleman (1966) has stated that, "Social simulation games pluck out of life a social arena, and attempt to reconstruct the principal rules by which behavior in this arena is governed and the principal rewards that it holds for the participants [p. 4]."

In reviewing the above observations, the present study incorporated aspects of both simulation and gaming. The gaming aspect was seen as meeting three of Shubik's goals of gaming; namely teaching, experimentation, and entertainment. The teaching component was evidenced in the attempt to train teachers to anticipate with greater accuracy. The experimentation goal was met through the conduction of the evaluation components which assessed the effects of the game and the transfer of anticipation skills to teacher behaviors. The goal of entertainment was evidenced through affective involvement demonstrated by the teacher participants.

The simulation aspect of the study entailed substituting the element of prediction within a classroom setting with predictions made within a game format (Harman, 1961). The simulation provided was also seen as a realistic game which would provide participants with lifelike problem-solving experiences related to their present work (Cruickshank, 1966). To use Twelker's (1968) terminology, the simulation was perceived primarily as a process. This view involved the act of anticipating as it would occur in classroom, teacher-pupil interactions. Thiagarajan (1971) supported this idea in his contention that the feedback provided players of the Anticipation Games (Semmel, 1971) was as realistic as the feedback to the classroom teacher. The simulation employed through the anticipation game "Battle Chips" also met two of Twelker's (1968) and Thoeny and Horton's (1970) three primary purposes of simulation: instruction and research.

Development and Application of Simulation and Gaming in Education

Historically viewed, education has adopted processes of gaming and simulation from business and industry which had been borrowed earlier from the field of military training. War games have been engaged in for some time, evidenced in a citation by Tansey and Unwin (1969, p. 2) of a reference describing a "new Kriegspiel," the first war game (played in 1798) to use maps. It appears that simulation of potential battles or tactics of an enemy was useful in determining, prior to expenditure of resources and personnel, what measures or reactions would be necessary depending on the various contingencies anticipated.

In the quest for a method of an economical, yet effective, means of training personnel in necessary facts, ideas, abilities, and management skills, the adaptation of war games to business and industry was seen as a way of accomplishing these goals. Since many of the problems in business are complex and contain many variables, simulation games can be used to simplify the problems and to extract from them the essential features on which wise decision making hangs.

The subsequent adoption of simulation procedures by educators occurred in the early 1960's (Hemphill, Griffiths, & Frederickson, 1962). Shubik (1971) has delimited "teaching and training"--two of his six main categories of gaming--into six subgoals. He views the teaching of games as: (1) a motivational aid to learning and (2) reinforcement for other methods of training. He also sees the use of games as a device for: (3) teaching facts, (4) teaching theory, (5) studying dynamic cases, and (6) teaching interpersonal relations. Under the main division of goals of gaming he calls "training," Shubik lists three subgoals: (1) teaching skills to individuals, (2) teaching bureaucratic or organizational behavior, and (3) dress rehearsals and "shake down" exercises (Shubik, 1971, p. 2).

Boocock and Coleman (1966) have pointed out that the structure of education for adolescents may be as important as the content taught. They then delineate certain structural defects in secondary education which make it inappropriate for the children served. They suggest that the value of games in secondary education can help overcome or at least mitigate these defects in structure by: (1) bringing the future to the present by allowing the child to assume roles he will later be playing in a large, differentiated society, (2) serving as motivating devices

devices where he sees discipline arising internally from the necessity of obeying rules so that a game will continue, and (3) providing for self-judgment by showing a player that his own actions determine whether he wins or loses (Boocock & Coleman, 1966).

Thus simulation and gaming techniques have become extremely relevant to a variety of educational settings.

Research on Simulation and Gaming in Education

Boocock and Coleman (1966) describe several games designed for in-class use with children and point out that these games have been tested in a variety of settings: among various social classes, grade levels, etc. In summarizing the findings they note that the most pervasive result in all the experiments concerns the motivating and self-sustaining qualities of the activity. In fact, they feel that "the positive reaction and extreme involvement of players may well be the most important kind of result such games could have [Boocock & Coleman, 1966, p. 224]."

Although it is admittedly stretching the definition of the word by placing the following under "research," the observations of two of the most respected writers in the field of simulation and gaming seem appropriate. In regard to the general learning that can accrue from games, Boocock and Coleman (1966) note three kinds of effects which seem to have occurred in some form in all the games they describe. First, students are able to acquire a very real feeling for the processes simulated, including an appreciation of the complexity of the real-life situation. Second, many players can become aware of the amount of information they must assimilate and the ability they must have to judge the planning required to make decisions in real-life situations, and they increase their confidence in reacting in such situations. A third type of change noted was an increased sense of the interconnections in the environment. Boocock and Coleman admit that this last point is based on data which is largely impressionistic, but they note it anyway based on the feeling that games have an important potential contribution in aiding students to see complex processes as a whole.

In an experimental study of the learning effects of two games with simulated environments, Boocock (1967) randomly assigned approximately 1200 subjects (CA range 13-20) to either a career game or a legislative game. In addition to the positive methodological factors of a large sample and random assignment, the fact that all subjects were engaged in playing a game helped control for a possible Hawthorne effect. However, by not having the population (all delegates to a conference of the National 4-H Clubs) engage in any form of learning other than games, the study could not reveal any information regarding the learning acquired through games as opposed to learning acquired through other means. Another factor not controlled was the representativeness of the population used, since it was found that over 80 percent of the subjects were in the top half (academically) of their high school classes. Another design problem was that the games were played in only one half-day session and the two questionnaires were administered only a few days apart. Thus, as Boocock (1966) points out, "the minimum effects of the games would be expected, plus a high likelihood of a test effect of the first questionnaire on the second [p. 9]." One of the study's findings was that the career game provided considerable data on the generation of role empathy although there appeared to be differential effects on boys and girls who assumed deviant roles.

The career game produced the most convincing evidence of factual learning. Interestingly, certain students--namely, girls, older students and high-achieving students--were found to do better than others at some of the tasks although there was no evidence that these students learned at a faster rate during the game. Although the actual changes were not large, Boocock pointed out that, in light of the short-term use of the game, it seemed to be a potentially important trend. It would be presumptuous to believe that substantial significant gains would accrue from a game of such brief duration, but Boocock felt that, under the circumstances, "the changes reported are rather impressive, and one would predict the longer use of the game would produce more learning [p. 16]."

Cherryholmes (1966) developed five hypotheses which he tested through examination of research on the application of simulation games. A problem inherent in this type of "study" is that the studies examined all varied with respect to the game used, the length of play, use of control groups, and the type of students playing. Four of the studies perused used high school students as subjects and two used undergraduates.

Five of the six studies reviewed collected data relevant to the first hypothesis which concerned student interest. The findings of the studies led to strong acceptance of the hypothesis that students report more interest in simulation activities than in more conventional classroom exercises. Each study collected data on learning, but no evidence was uncovered supporting the contention that participants in a simulation learn more facts or principles than they would by studying in a more conventional manner. Only one study collected retention data, but the hypothesis was rejected which indicates that students do not retain more information learned in a simulation compared to more conventional techniques. In regard to critical thinking and decision making, only one study reported relevant data which led to the rejection of the hypothesis implying that students were found not to gain critical thinking and problem-solving skills in a simulation relative to more traditional methods. Three of the studies looked at attitude change and the hypothesis here was tentatively rejected: students participating in simulation games acquire realistic attitudes about the referent system, but so do some students using more conventional materials.

Inbar (1966) has recognized two consensual points in regard to simulation games: (1) they have a striking impact on the participants and (2) this impact is differential (i.e., different players react differently to game sessions in terms of both learning and enjoyment). He, therefore, conducted a study on the precise nature of one game's impact and on the reasons why there are differential effects on the players. Inbar pointed out that there are several main factors which could account for the differential impact of a game. These are: (1) variations in the players' background characteristics, (2) differences in their predispositions, (3) differences in their experiences and behavior while the game is going on, and (4) differences in the characteristics of the groups of which they are members. His interest was in determining the importance of each of these types of variables in understanding variations in enjoyment and learning over individuals and over groups.

He divided 220 subjects into 23 groups of 8 to 11 players, each of whom played a game simulating a community disaster. Pre- and post-measures were given: the first assessed the players' predispositions and their original level of knowledge on the learning variables; the second measured the impact of the game. The major finding of the study was that, within groups, the group effect is the major determinant of the impact of the session upon the players for both learning and enjoyment. However, after partialling out the group effect, the players' predispositions remain an important explanatory dimension, accounting for one-third of the explained total variance of enjoyment and approximately one-fourth of the learning variance. A step-wise multiple regression revealed that the following three dispositions made the greatest contribution to understanding the process being studied: (1) wants to learn more on the topic, (2) engaged voluntarily in the game, and (3) was willing to participate in meetings on the topic. Inbar (1966) felt that the evidence indicates that willingness to take part in the simulation because of aroused interest in the topic, rather than factors reflecting more rooted values such as learning preferences or even liking games in general, is the best warrant of a positive reaction to the session (p. 26).

Inbar analyzed the differential impact of the game over groups and he noted that the size of the playing groups stands out as the major explanatory variable. In overcrowded groups the players learn the game's rules less efficiently, interact less, are less interested in the session, and participate less actively in it. As a consequence of these factors, they tend to play a lesser number of moves and the impact of the game is weaker. An interesting finding was that the players' experience in the game seems to be of little explanatory value, but this conclusion cannot be justifiably made on the basis of one study. He found, also, that the first few minutes which precede the play proper are very important in affecting the players. This, combined with the other findings mentioned above, led Inbar to suggest that "the impact of games with simulated environments depends more on the capability of the person in charge of the session than one would have suspected [p. 27]." Thus, Inbar (1966) feels that more attention than is now usual should be paid to holding sessions under favorable conditions (i.e., by developing sessions which are properly presented and handled).

In summarizing the research reviewed relative to simulation and gaming in education, several tentative conclusions can be rendered. The foremost conclusion is that games and simulations are seen as motivating devices which lead to greater and more sustained interest and involvement in the game or activity by the participants. Although it may likely be a reflection of the paucity of research incorporating adequate designs and controls, the existing studies have been unable to demonstrate consistently positive changes in learning as a function of participation in gaming and simulation experiences.

However, as Boocock and Coleman (1966) have pointed out, simulation games appear to impart a "real feeling" for the process simulated and an appreciation of the complexity of the process for those playing. Players also become cognizant of the information required and the nature and means of decision making in real-life situations as a result of simulating such situations, and their confidence in acting in similar situations is increased.

Additionally, investigators (Boocock, 1966; and Inbar, 1966) have shown that games and simulations have differential impacts on players, and there are a number of factors such as the participants' backgrounds, predispositions, and the characteristics of their playing group which could account for these differences. Research by Inbar (1966) stressed the need for constituting game-playing groups with relatively small numbers of players and for game sessions which are properly presented and carried out. Therefore, attempts were made in the present study to develop a game that was intrinsically motivating and to introduce the games and monitor the game sessions in a manner that would not be inhibiting to the participants.

Applications of Simulation and Gaming to Teacher Education

Games and simulations have been widely applied to a variety of educational purposes and, in recent years, they have been utilized in training teachers. Twelker (1967) described an extensive project in Oregon using simulation as an instructional medium which was begun when Kersh built a simulation facility and initiated the development of a variety of classroom situations. Briefly, in this project a teacher trainee undergoing the simulation experience was presented with problematic situations filmed so that a typical class appeared to be reacting directly to the student teacher who was viewing the sequences. There were various alternative feedback sequences provided for each problem which showed the trainee, through responses of children, the consequences of his own classroom behaviors.

When evaluating the effects of the simulation training, Kersh asked 80 trainees how they felt about their simulated experiences. He drew 295 different responses. Of these only one response stated that the experience was generally not beneficial. Twelve trainees thought that the problems were unrealistic, and there were other critical comments which were fewer in number. Of course the significance of such responses cannot be evaluated until comparable data are obtained for other instructional techniques.

D. Cruickshank (1966) contends that the usual techniques of observation and student teaching do not provide for freedom of the trainee to act as the chief decision maker in the classroom. Often, the decisions these individuals do make are merely extensions of those which the trainee thinks would be acceptable to the supervising teacher. Cruickshank feels that simulation may be a viable means of providing a realistic setting through which teacher trainees or teachers in service may practice a wide range of teacher behavior without fear of censure or failure.

Cruickshank cited results of other studies of simulation which substantiate his observation. Kersh (1965) found that students who underwent simulation training were ready to assume full responsibility during student teaching up to three weeks earlier than a control group not having such training. Vleck (1965) found that simulation increases participants' confidence in their ability to teach. Weinberger (1965) has reported that engagement in a simulation experience resulted in a positive modification of the feelings of the participants in regard to their behavior on the job.

Cruickshank (1966) then added five positive aspects of simulation experiences, although he provided no data upon which the advantages are based. They are: (1) participants consider the simulation experiences stimulating and highly motivating; (2) simulations allow participants to encounter and play out instructional problems much earlier than they normally would and in a much shorter time span; (3) they allow participants the opportunity, without fear of reproof, to practice principles they have learned in education courses; (4) they acquaint participants with school records, regulations, and children in meaningful ways; (5) they allow participants to encounter teaching problems and engage in problem-solving activities which may reduce the intensity or number of problems they will face as first-year teachers. Additionally, he pointed out that, with the increasing shortage of available space for observers and student teachers, simulation may well fit an important void by bringing the classroom to the student.

A more recent discussion by Cruickshank (1969) brought out the idea that educators are interested in the use of simulation methods which permit the integration of educational theory and classroom practice. He feels that the best reason for interest in simulation may be the overwhelming excitement and involvement it creates in its participants. This is an observation supported by other writers (Boocock & Coleman, 1966; Cherryholmes, 1966; and others). Evidence, he feels, that the profession has turned to recognize the potential of simulation training is seen in the proposed national accreditation standards, where the term "simulation" appears for the first time and is recommended as an appropriate technique for laboratory experience. Furthermore, Cruickshank added that "simulation seems to offer intellectual and economic benefits to both the teacher education student and the university, real enough so that the profession increasingly turns to the process to aid in both pre and inservice programming [Cruickshank, 1969, p. 26]." However, he also added that simulation systems require careful evaluation to determine whether or not they should be employed (i.e., do they result in a greater amount of growth than occurs through traditional methods?) and where they should be applied (i.e., pre-student teaching, pre-first year teaching, etc.) He sees a need to determine how well learners transfer what they have learned during simulation training to real classroom teaching.

Wood and Hedley (1968) examined some student reactions to the use of videotapes in simulated classroom situations. Their subjects were 16 students from science and English methods courses who were learning and practicing eight elements of lessons. At first, other college students constituted the "class" for instructional purposes, but later a group of eighth-grade girls were used and were found to provide a more realistic simulation. As a part of the project, students were asked to evaluate their experience by rank ordering those aspects of the program which were most important to them. Four (out of nine) items which were marked highest in importance were: (1) the identified discrete lesson elements; (2) student involvement; (3) group discussion and criticism; and (4) the use of short presentations based on discrete units. The authors then made ten observations and implications which are in support of the practices employed in the project. Many students felt that their experience in the program was the most valuable in their professional preparation.

Using a sample of 192 undergraduates in educational psychology at Oregon State University, Ryan (1968) studied the use of simulation to increase transfer. The subjects were randomly assigned to one of four treatment groups involving some combination of: (1) a choice-simulation or no choice-simulation where they had or did not have a choice of approach for gaining knowledge and (2) exposure or no exposure to simulated-situation problem-solving tasks. Data analyses showed that the combination of a student-selected method for acquiring knowledge and practice in solving simulated problems was most effective in increasing transfer-of-learning outcomes.

Broadbent (1967) described a study involving a two-week simulation of a fifth-grade classroom designed to give student teachers an opportunity to encounter potential problems that face beginning teachers. The investigation was based on a list of 32 teaching problems experienced by new graduates which had been identified in a prior survey. In presenting the problems to 20 student teachers, a fictitious community, school district, elementary school, and fifth-grade were created and were introduced through filmstrips, audiotapes, and a faculty handbook. After acquainting themselves with the "school" and "students," they were presented with 31 incidents incorporating the 32 problems. Some of the incidents were presented by film while others were presented in written materials such as notes from parents, memoranda from the principal, etc. Broadbent states that, in the evaluation of the project, comments were highly favorable and many students commented on the positive effects of high involvement. He mentioned that a more detailed evaluation comparing the effects of the simulation on students with those student teaching during the two week period was carried out, but the results were not available at that time.

Although they are unrelated to his study, Broadbent does offer several advantages that the use of simulation can bring to teacher education programs: (1) practice can be provided that would be too costly or unavailable otherwise; (2) controlled feedback can be added to practice sessions; (3) the model can be simplified and tasks can be programmed from simple to complex; (4) increased involvement of participants results in greater motivation and learning; (5) practice of involvement in a special role or in many roles in the same organization can be provided; and (6) since experiences are selected by the designer, negative or harmful experiences can be eliminated.

In summary, the research reviewed on gaming and simulation in teacher education has shown that these techniques have been widely applied in training teachers (Kersh, 1965; Vleck, 1965; Weinberger, 1965; Twelker, 1967; Wood & Hedley, 1968; Ryan, 1968; and Broadbent, 1967). As Cruickshank (1966) and others have stated, the use of gaming and simulation techniques has an enormous potential for incorporation into teacher preparation programs. However, this area of research has been plagued by the same problem noted in general research on simulation and gaming: a dearth of research studies on the effects of simulation games on participants and the fact that those studies carried out are often more anecdotal than analytical in their presentations. An observation which pervades most of the writings in this area concerns the positive affective reactions of teacher trainees regarding their simulation and game experiences in their college coursework.

The research does imply that teacher trainees can acquire better understandings of children and of ways of interacting with pupils as a function of experiencing simulations and games in their preparation. Thus, these findings supported the use of a simulation game with teachers as was carried out in the present work. The section following can be viewed as a culmination of the research already reviewed on anticipation and simulation and gaming. The section contains studies on anticipation games which simulate classroom teacher-pupil interactions in a game setting with the intent of training teachers to anticipate children's responses.

Anticipation Games

The following studies are those that are most relevant to the present investigation. Studies on the applicability and training potential of anticipation games have been conducted at the Center for Innovation in Teaching the Handicapped at Indiana University.

Semmel and Sivasailam (1971) conducted a pilot validation study to assess the effects of Anticipation Games (Semmel, 1971) on increasing skill in anticipating responses of retarded and nonretarded children within the game format. The study used a single, naive, foreign-born subject who played 20 games with different opponents. The games require that players anticipate responses of different types of children (normal, low EMR--IQ 50-65, and high EMR--IQ 66-80) to different curricular tasks (reading, language, arithmetic, and work/study). The feedback following anticipations is immediate and is based on empirically derived normative data from a large sample of pupils having the same age and intellectual characteristics as those for which participants of the game predict.

The results of the study showed that the rate of learning to anticipate was highest for normal pupils and second highest was that of the 50 to 65 IQ group. The rate of learning to anticipate the responses of pupils with IQs from 66 to 80 was the lowest. There was a trend indicating a positive relationship between rate of learning to predict accurately and age of the pupils for whom predictions were made. Interestingly, a pre- and posttest attitude questionnaire indicated a decrease in the experimental players' positive attitudes toward retarded children as a result of playing the anticipation game. In summary, the authors stated that, "The results seem to substantiate the hypothesis that the anticipation skill of players increases as a result of continuous playing of the game [p. 10]."

Zimmerman and Swenson (1972) used the same Anticipation Games (Semmel, 1971) as did Semmel and Sivasailam (1971) in conducting their study. In examining the ability of noncertified teachers of the educable mentally retarded to increase their abilities to predict or anticipate specific behaviors, they have tentatively found that the experimental teachers (those that played an Anticipation Game) were significantly ($p < .05$) more homogeneous in their predictions than were the control teachers (those playing a game but not one designed to increase anticipation skills).

The paucity of studies on training anticipation skills through an intervention in a game format does not allow definite conclusions. However, inasmuch as the studies are similar in certain respects to the present investigations, they have contributed to the generation of hypotheses which will be presented in the next chapter.

The basic findings have been that anticipation skills can increase as a function of playing an anticipation game (Semmel and Sivasailam, 1971), with the learning rates being more rapid for low-IQ-level EMRs than for high IQ level EMRs. Although it was not tested in a game context, it has also been noted that females are more accurate predictors of the responses of EMR children and that there is a trend indicating a positive relationship between anticipation skills and experience with EMR children (Semmel, Garret, D. Semmel, & Wilcove, 1973).

Summary

Anticipation

The review of literature presented above related to the problem discussed in Chapter I. A major conclusion generated from this review is that anticipation of pupil performances by teachers is a complex phenomenon which is, in large part, a function of the types of behaviors anticipated. Research has shown that, in certain performance areas (especially that of reading), teachers are capable of reliably predicting pupil behaviors and these predictions can lead to increased understandings of those pupils. In other areas (i.e., sociometric status of pupils), however, findings have been inconclusive. In addition, several studies have revealed that individual teachers vary considerably in their prediction accuracy. It has been shown that teachers make differential anticipations of children of differing intellectual levels and that there is a relationship between anticipation abilities and experience, with contradictory evidence relating to the direction of the relationship. A major finding which relates specifically to the current study is that it is possible to train teachers to become more accurate in their predictions of pupil behavior.

These findings strongly indicate the need for research on the theoretical and practical aspects of anticipation. More data needs to be gathered relative to types of pupil performance which can be predicted, the relationships between pupil and teacher variables and prediction performance, and the identification and development of methods whereby anticipation abilities of teachers can be improved.

Simulation and Gaming

The application of games and simulations in a variety of learning situations has demonstrated that they lead to greater and more sustained interest and involvement in the activity pursued. Additionally, simulations have been effective in developing decision-making competencies and confidence in participants regarding real-life problems and situations. Games have been found to have differential impacts on players with a variety of factors potentially influencing those differences.

Game and simulation abilities, implemented through a variety of methodological and physical formats, have been utilized in teacher education programs. The literature states that teachers are better able to understand children and the teaching process through participation in simulation and game experiences. A major problem noted in the total area of gaming and simulation, as well as that pertaining to teacher education, is the paucity of well-controlled research endeavors incorporating experimental designs. Due to this fact, few conclusive statements can be made regarding the actual effects of these types of programs and experiences.

Relevance of Literature Review to Current Study

The literature reviewed above has generated several questions which require answering. Is anticipation a viable concept for attempting to provide teachers with better understandings of students in their classes? If teachers can become better at predicting or anticipating pupil behaviors through some type of program designed to enhance their anticipation abilities, will this skill be transferred to their in-class interactions with pupils? Can a game format be an effective means of developing anticipation skills? Are there relationships between teacher and pupil characteristics and teachers' anticipation abilities? Is the type of child a teacher has in class or the type of class in which he teaches related to his anticipation performance?

It was expected that the current investigation could contribute significantly toward answering the above questions. Inasmuch as it has been shown that teachers are variable in their prediction abilities and that, potentially, they can be trained to become better predictors, an attempt was made to inculcate this skill in teachers relative to educable mentally retarded children--children who have been known to vary widely in their educational characteristics. The current study was also designed to show that anticipation skills can add to teachers' understandings of EMR children as evidenced in their ability to anticipate responses the students will make to various types of questions. Concomitantly, the study assessed the efficacy of a game format as a means of developing the desired skills. These questions as well as those pertaining to relationships between teacher and pupil characteristics and anticipation abilities have not yet been answered, and this investigation was seen as providing relevant information which could help answer such considerations. Additionally, the relatively few studies conducted in a scientific manner in the areas of anticipation, simulation and gaming, and anticipation games lent credence to the current study which was experimentally designed.

CHAPTER III

HYPOTHESES

The primary purposes of the present study were to increase teachers' understandings of EMR children through a treatment designed to develop their anticipation skills and to assess the transfer of those skills to their anticipations of children they teach. The design of the evaluative components of the study involved an assessment of the game participants' acquisition of anticipation skill accuracy as a function of the game play and, subsequently, evaluation of their predictions of responses of randomly-selected children in their own classes. The latter evaluation was performed by comparing teacher predictions of pupil responses to a series of questions with the actual responses of the pupils. Prior to the conduction of the evaluative aspects, two developmental facets of the study were carried out. These included the collection of a body of normative data on EMR children for incorporation into the anticipation game and the development of game format and materials.

Analyses of the findings were expected to reveal that teachers increased in their anticipation accuracy as a function of experience in playing the game and that those teachers who played the anticipation game would perform better on the criterion measure than would control subjects. It was also expected that anticipation skill would be related to specified teacher characteristics and to teachers' judgments of the ability levels of their pupils.

Anticipation Skill Development

The following hypotheses relate to teacher anticipation skill development as a function of playing an anticipation game called Battle Chips.

Hypothesis 1: *Teachers playing the anticipation game increase significantly in their prediction accuracy as a function of the number of prediction trials in playing the game*.

This hypothesis is derived primarily from the results of a previous anticipation game study (Semmel & Sivasailam, 1971) and from the literature concerning the relationship between prediction and training cited in Chapter II. Semmel and Sivasailam (1971) found that the anticipation skill of the players of a game similar to the one developed as a part of this study increased as a function of continuous play of the game. Additionally, Oskamp (1961), Newton (1965), Thomas and Mayo (1957), and Imig (1966) all found increased prediction abilities following training.

The use of a game format, which, in the case of Battle Chips, constitutes a simulation of in-class predictions of pupils' responses, also contributes to this hypothesis. Kersh (1965) found that students who underwent simulation training were ready to assume full responsibility during student teaching up to three weeks earlier than a control group not having such training, and Vleck (1965) found that simulation increases participants' confidence in their ability to teach.

Hypothesis 2: *A significant correlation exists between years of teaching experience and prediction skill when playing the game*.

The above hypothesis is based, in part, upon the findings reported by Semmel, *et al*. (1973) in which a trend was noted relating amount of teaching experience to accuracy in anticipating the responses of EMR children. Positive relationships between experience and prediction skills were noted by Melton (1953), Oskamp (1961), and Kottmeyer (1947). However, since Gronlund (1950) found no relationship and Smith (1969) found a negative relationship between these two variables, the direction of the hypothesized correlation is not indicated.

Hypothesis 3: Teachers' predictions when playing the game are significantly more accurate when predicting responses for pupils of the age they are currently teaching than for other age levels.

The basis for this hypothesis lies primarily in the fact that the evaluative components of the study were conducted near the end of the academic year. The teachers who took part in the study, therefore, had almost nine months of interaction with their students prior to the initiation of the intervention described above. Their "understandings" of children of the age level they were teaching should have been optimal by the time the treatment was begun, and it would follow that they would make more accurate predictions of responses of pupils of that age level than of pupils of a younger or older age level.

Hypothesis 4: Teachers are significantly better predictors of low-IQ-level EMR children than of high-IQ-level EMR children.

The rationale behind this hypothesis lies partially in the finding of Semmel and Sivasailam (1971) who noted that players of an anticipation game learned at a more rapid rate to anticipate accurately responses of lower-IQ-level EMR pupils than they did for higher-IQ-level EMRs. Tyler (1968), in his study of kindergarten and first-grade teachers' predictions of pupil reading success in grade four found significant correlations between teachers' anticipations and pupil mental maturity.

Barnard, Zimbardo, and Sarason (1968) demonstrated that teachers could discriminate, on the basis of IQ, 14 out of 24 personality and performance characteristics of their students. This finding was significant beyond the .05 level of confidence. The above hypothesis is further supported by a body of literature dealing with teacher predictions of pupil IQ (Garrison & Tippett, 1922; Averill, 1923; Varner, 1923; Morrison, 1924; Pressy & Long, 1924; and Hubbard & Flesher, 1953). These studies have, in general, found that teachers can reliably estimate the IQ levels of their pupils.

Hypothesis 5: *Significant correlations exist between teacher prediction accuracy during the game play intervention and teacher variables of*: *age*, *sex*, *type of class* (self-contained or not self-contained), *educational level*, *and impressions of the anticipation game*.

The foundation for this hypothesis was that a number of investigators have found relationships both between characteristics of predictors and prediction accuracy and between player characteristics and game-play performance. Smith (1969) found that those teachers in his study who were the most accurate predictors were more other-person oriented and more responsible than were less accurate predictors. He also found tendencies for more accurate predictors to be more democratic, open, and affiliative than were those who were less accurate. Gage, Leavitt, and Stone (1955) found that male teachers were significantly ($p < .05$) less accurate than female teachers in predictions of pupil responses on a cognitive aspects test. Gage, et al. also found that predictions of different types of performances in children were differentially and significantly related to the grade the teachers were teaching.

Inbar (1966) has noted that simulation games have differential impacts on participants. In stating this he emphasized that different players react differently to simulation game sessions in terms of both learning and enjoyment. Furthermore, two of the main factors which could account for the differential effects of the games are variations in the background characteristics of the players and differences in the characteristics of the groups of which they are members.

Hypothesis 6: *When playing the game, prediction overestimates will be significantly correlated with the following teacher characteristics: age, sex, type of class, educational level, and impressions of the anticipation game*.

The relationship hypothesized above stems from Melton's (1953) observation that predictions of the subjects in his study were more often overestimates than underestimates.

Transfer of Anticipation Skill

The following hypotheses relate to teachers' performances on the criterion measure which assesses the transfer of their anticipation skills to classroom-relevant anticipations.

Hypothesis 7: *Teachers who play the anticipation game, when compared to control subjects, demonstrate significantly greater prediction accuracy in anticipating responses of children they teach*.

The rationale behind this hypothesis is derived from the research on the improvement of prediction abilities following training cited in the previous chapter. Increased prediction accuracy was found by Oskamp (1961), Thomas and Mayo (1957), Newton (1965), and Imig (1966), all of whom found increased accuracy of prediction as a result of training. The above findings suggest that anticipation is a skill which is amenable to positive change as a function of training.

Hypothesis 8: *Teachers who teach self-contained classes perform significantly better* (i.e., are more accurate predictors) *than those teachers who do not teach self-contained classes*.

The implicit assumption underlying this hypothesis is that the quantitative aspect of teacher-pupil interaction allows for a greater understanding of individual pupils by teachers of self-contained classes relative to teachers of non-self-contained classes. The teachers who have self-contained classes interact with pupils in the class for an entire day, whereas those that do not have self-contained classes may see a child for only one or two 45-minute periods during a day. The teacher of the self-contained class would, therefore, have the opportunity to learn more about the individual natures of the children he teaches and, thus, would be more likely to predict how the children would respond to questions relevant to the curriculum he follows.

Hypothesis 9: *Teachers are significantly better anticipators of low-IQ-level EMR children than of high-IQ-level EMR children*.

The literature supporting this hypothesis, as in Hypothesis 4, states that anticipation game players learn to anticipate more accurately responses of lower IQ level EMR children than they do those of higher IQ level EMR children (Semmel and Sivasailam, 1971). Significant correlations have been found between anticipations and pupil mental maturity (Tyler, 1968) and between predictions of pupil IQs and actual pupil

IQs (Garrison & Tippett, 1922; Averill, 1923; Varner, 1923; Morrison, 1924; Pressy & Long, 1924; and Hubbard & Flesher, 1953). It also has been shown that, on the basis of IQ, teachers can discriminate between pupil performance and personality characteristics (Barnard, Zimbardo, & Sarason, 1968).

Hypothesis 10: *Significant differences exist between teachers' predictions of the practical-functional component of the factor analytically derived criterion measure and the other four components with significantly better predictions by experimental than by control subjects*.

The EMR child is often referred to as the "9 to 3 retardate," which implies that he functions subnormally primarily in relation to school situations and school-related tasks. Therefore, it is predicted that the EMR child performs less well on questions requiring academic types of knowledge and skills whereas he performs better on practical types of questions which are not necessarily related to traditional school curricula. Teachers of these children incorporate their observations of these characteristics into their predictions of responses, and sensitization to thinking predictively about children through playing the anticipation game makes the experimental teachers more aware of this phenomena than are the control teachers.

Hypothesis 11: *A significant negative relationship exists between teachers' prediction accuracies and their assessment of the general ability levels of children they teach*.

The foundation for this hypothesis stems from the finding of the Semmel and Sivasailam (1971) pilot study regarding player differential prediction accuracies for high- and low-IQ-level EMR children. Their finding indicated a greater facility of participants to predict responses of low IQ level students as opposed to predicting responses of high-IQ level students. If teachers are, in fact, better predictors of low-IQ-level EMR children, and, assuming a positive relationship between IQ and assessment of general ability, then teachers should obtain greater prediction accuracy the lower they assess individual children.

Hypothesis 12: Female teachers demonstrate greater prediction accuracy than do males.

The research findings underlying this hypothesis were gleaned from the finding of the Semmel, Garrett, D. Semmel, and Wilcove (1973) and the Gage, Leavitt, and Stone (1955) studies. The former study, which assessed prediction accuracies of different groups of college students, found that female subjects anticipated better than males the most frequent responses for EMR children and normal children grouped and for EMRs alone. The Gage, et al. (1955) study showed that male teachers were significantly ($p < .05$) less accurate than female teachers on predicting cognitive aspects of pupil performance.

Hypothesis 13: Significant interactions exist between teacher prediction accuracy and teacher variables of age, sex, type of class, educational level, impressions of the anticipation game, and supervisor's ratings of teacher performances.

The above hypothesis, like Hypothesis 5, stems from findings of studies which have demonstrated relationships between anticipation accuracy and predictor personality characteristics (Smith, 1969), sex, and grade taught (Gage, Leavitt, & Stone, 1955). Inbar's (1966) finding of the contribution of players' predispositions to the explanation of substantial portions of the variance of learning and enjoyment during game play also supports the above hypothesis.

The hypotheses generated above were based upon the rationale for the study presented in Chapter I and the review of literature developed in the second chapter. The following chapter will describe the method whereby the hypotheses were tested.

CHAPTER IV

METHOD

The purposes of the present chapter are to describe the development of materials, the selection of subjects, and the research design and procedures employed to test the hypotheses of the current investigation.

There were two developmental and two evaluative components of the study. The developmental facets included (1) the collection of a body of normative data and (2) the development of an anticipation game incorporating the normative data. The two evaluative aspects of the investigation consisted of (1) assessing the acquisition of anticipation skills by the game participants (teachers) and (2) evaluation of the transfer of these skills to classroom-relevant behaviors. These four components will be considered in the sequence presented above.

The Cincinnati, Ohio, public school system was selected as the site for acquiring the normative data and for conducting the experimental study. This was based on the fact that Cincinnati has a large special education program and sufficient numbers of pupils and teachers for the purposes of the study. The Cincinnati Public Schools also has a well-developed curriculum and a comprehensive guide for implementing the program for educable retardates. A research proposal application was prepared, sent to, and approved by the research division of the Cincinnati Public Schools. Appendix A contains a copy of the letter indicating approval of the research proposal.

Developmental Components

The developmental aspects of the study will be treated in their temporal order: the acquisition of normative data followed by the design and construction of an anticipation game incorporating the normative data.

Normative Data Collection

The collection of normative data to be employed in the development of an anticipation game was seen as necessary for several reasons. The normative data already in use (Meyen & Hieronymus, 1970) in existing Anticipation Games (Semmel, 1971) had been collected on a sample of 1,405 EMR pupils over four major curricular areas (reading, language, arithmetic, and work/study). However, the pupils' responses may have been biased by their reading abilities. They were required to read the questions before answering; a child who ordinarily might have known the answer to a question read orally may have been penalized by an inability to read a question and its optional answers.

It was felt that the items for which teachers would be anticipating in the game should be curricularly relevant to the teachers' programs and to the children they taught. Therefore, the question was raised regarding the generalizability of the responses of children in Iowa, a state containing many rural areas, where the first set of normative data was collected, to an urban area several hundred miles away. Also, Semmel and Sivasailam (1971) in their study employing the Anticipation Games (Semmel, 1971) found that, "Most of the players were...a little uneasy about the norms used in the game [p. 3]." They suggested that possibly a different set of normative data could be collected and used in the game. Furthermore, the Cincinnati curriculum guide for EMR pupils appeared to be a logical basis for selecting items on the assumption that teachers were encouraged to use the guide in providing uniformity of content, sequencing, and continuity to the special education program.

Subjects. For the purposes of collecting normative data, responses from 290 students in special classes for the educable mentally retarded (EMR) in five junior high and three senior high public schools in Cincinnati, Ohio, were used. Of the 190 pupils, 132 ranged in chronological age between 13 and 15, and 158 ranged in age between 16 and 19. Ninety-nine of the sample had IQs between 50 and 64 according to an individualized standardized intelligence test, and the IQs of 191 of the sample fell between 65 and 80. One hundred sixty-six of the sample were male and 124 were female.

Instrument. A 70-item instrument was developed with item selection based upon the 12 Persisting Life Problem (PLP) areas of the Cincinnati curriculum guide for EMR pupils (The Slow Learning Program in the Elementary and Secondary Schools, 1964). Some of the items incorporated into the instrument were adopted from the original Anticipation Games (Semmel, 1971). The 12 PLP areas refer, as their names imply, to identified salient needs in the lives of individuals labeled as educable mentally retarded (EMR). It was necessary to operationalize the problem areas into specific questions to which pupils could respond in a relatively short period of time. Therefore, PLP #12 "Learning to Travel and Move About," for example, was presented in the form of map reading questions to which a child could respond quickly,relative to assessing, for example, his knowledge of finding his way home or to a certain location in the city. The 70 items included in the test are presented in Appendix B.

Differential numbers of items were selected from the various PLP areas in that some were more amenable than others to yielding multiple-choice questions. For instance, PLP #13 "Learning to Communicate Ideas" encompasses vocabulary, spelling, language skills, and arithmetic skills, and, therefore, would contain more items than would PLP #8 "Learning to Appreciate, Create and Enjoy Beauty." Once the 70 questions were developed, they were selected randomly for inclusion in the instrument. For some similar types of items, however, it was expedient to group them. The 12 PLP areas and the questions which constitute each PLP along with the corresponding numbers of the questions (See Appendix B) are found in Table 3.

Procedure. The administration of the instrument was conducted in the following manner. The teachers, in most instances, had been informed by their supervisor that the investigator would be coming to administer a test to their students, but they were given no details as to the nature of the instrument. The investigator visited a school, introduced himself to the teachers, and asked to set up a convenient time for testing the children. Generally, the teacher indicated that testing could begin immediately or at the termination of the lesson in progress. Some teachers suggested another day of the week and specified a time which would be most convenient.

When the time came for distributing the tests to the students, the investigator mentioned to the teacher that, since he would be staying with the class, it would be a good opportunity for the teacher to take a break for about a half hour or 45 minutes. Generally, teachers would immediately leave the room, but in the cases where the hint was not

Table 3

Questions Comprising Each of the 12 Persisting Life Problem (PLP) Areas of the Cincinnati Curriculum Guide for the Educable Mentally Retarded

PLP #	Title of PLP	Questions in 70-item Instrument (See Appendix B)
I.	Learning to Keep Healthy	3, 19, 28, 39, 59
II.	Learning to Live Safely	12, 18, 40, 55, 63
III.	Learning to Communicate Ideas	
	Vocabulary	41, 42, 43, 44, 45
	Spelling	7, 8, 9, 10, 11
	Language Skills	20, 21, 29, 30, 31
	Arithmetic Skills	4, 5, 15, 32, 34, 47, 48, 56, 61, 65
IV.	Learning to Be a Responsible Citizen	14, 33, 46, 60
V.	Learning Homemaking and Family Living	1, 22, 49, 62
VI.	Learning to Understand Oneself and Get Along with Others	24, 35, 51
VII.	Learning to Understand the Physical Environment	16, 25, 50, 57
VIII.	Learning to Appreciate, Create and Enjoy Beauty	6, 17, 52
IX.	Learning to Use Leisure Time Wisely	23, 36, 37, 53
X.	Learning to Earn a Living	26, 27, 58, 64, 66
XI.	Learning to Manage Money	2, 13, 38, 54
XII.	Learning to Travel and Move About	67, 68, 69 70

heeded, the investigator asked them if they would leave during the test administration on the basis that the children might not feel they could respond freely and honestly in the presence of their teacher and/or that the design of the study required that all students take the test in the same manner--with only one adult present in the room. No teachers, therefore, were present during the administration of the instrument.

Once the teacher had vacated the room, the students were told that they would be given some questions to answer but that their answers would not affect their grades in school. It was indicated to them that none of their teachers would see their answers to the questions. Therefore, they could be honest and just select the answer that they thought was right. They were told that if they were not sure of the right answer they should try to take a "good guess." The tests were then distributed and the students were directed to put their name, age, and date of birth in the upper right-hand corner of the first page and the name of their school and the date (of testing) in the upper left-hand corner.

The directions on the first page of the instrument (see Appendix B) were then read aloud by the investigator and the students were encouraged to read along. The pupils were again reminded that their responses would not affect their school grades and that they could guess if they were not sure of the correct answer. They were also told that they could ask to have a question read over a second time if they had not heard it properly the first time. Finally, the students were asked if they had any questions regarding what they were supposed to do.

The investigator then began reading the questions and all of the options of each question at a moderate pace. If he felt the pace was too fast for many of the children, he would slow down slightly. Intermittently, the students were encouraged to continue reading along while the examiner read the questions and options. When a student would raise his hand and ask to have a question read again, that question was repeated. There was a pause between each question to allow the students to circle the letter of the option of their choice, and additional time (about one minute) was allotted for working problems involving arithmetic operations. On the average, senior high students required about 30 minutes to complete the 70 items and junior high students required approximately 45 minutes. Care was taken to insure that each test protocol distributed was collected following the test administration.

The IQ levels for the children were obtained from class lists in the Special Education Department in the administration offices of the Cincinnati Public Schools. A list of the 290 children, by each school, was prepared and a minus placed next to a child's name if his IQ was between 50 and 64, and a plus recorded if his IQ fell between 65 and 80. Originally, it had been the investigator's intent to record actual IQs but discussion with Board of Education personnel led to the conclusion that the above indications of IQ level were sufficient for the purposes of this study.

Once all 290 tests were obtained, each item was scored by placing an "X" next to incorrect items and making no mark next to correct items. Subsequently, all subjects were assigned a subject number within schools and the following data were punched onto IBM cards: school number, subject number of the pupil, pupil's age, IQ level, sex, the type of class (self-contained or not self-contained), the option the pupil chose for each of the 70 items, and whether the option selected was correct or incorrect. Once the cards were punched, they were sorted into four groups according to age levels (younger--CA 13-15; older--CA 16-19) and IQ levels (lower--50-64; higher--65-80). The numbers of pupils falling into the younger-lower IQ, younger-higher IQ, older-lower IQ, and older-higher IQ groups were 48, 84, 51, and 107, respectively.

These data were then analyzed through use of a CDC 6600 computer, and a frequency distribution in percentages was obtained for responses by each of the four groups of pupils to every option of each question. These percentages can be found in Appendix C. Each question number corresponds to the questions in Appendix B.

Anticipation Game Development

Originally, the investigator had planned to incorporate the newly acquired normative data into one of the existing Anticipation Games (Semmel, 1971). However, the play of the game in this study was to differ somewhat from the previous Anticipation Games. The former games had required that players predict only for the correct option of each question, while, in this game, players would be required to predict percentages for all options whether correct or incorrect. In previous games only one player had predicted at a time, but the intent for this game was to have all players predict simultaneously. Also, the anticipated availability of subjects for the evaluative components of the study suggested a game format that would be especially amenable to play by two participants. Therefore, the investigator, in conjunction with staff members of the Instructional Development Laboratory at the Center for Innovation in Teaching the Handicapped, Indiana University, developed a new anticipation game.

The game was developed according to game design principles such as those posited by Thiagarajan (1971). It was the intent of the developers to produce an intrinsically motivating game which engaged all participants in play throughout the game, possessed elements of chance, moved at a rapid pace, and had simple rules and a simple scoring system.

After trying several formats, a game was developed which involved winning or losing poker chips. Thus, the name given to the game was "Battle Chips." The game itself and the rules were developed during the game play and concomitant revising of the game format and manner of play. A description of the equipment used in playing the game, the object of the game, and the rules of play can be found in Appendix D. A response sheet was developed on which players could record and check their predictions, and through which a record of the age group and IQ level for which predictions were made would be preserved. A copy of the "Response Sheet" is presented in Appendix E.

Once the game was developed, the investigator engaged several of his colleagues in a field testing situation to determine relative time for going over the rules and for playing a game.

Evaluative Components

Following the completion of the two developmental aspects of the study, the two evaluative components were initiated. They consisted of (1) a treatment defined by playing "Battle Chips" and an assessment of the game in developing anticipation abilities and (2) the transfer of these skills to relevant classroom anticipations.

Treatment and Assessment of Anticipation Skill

After the physical equipment necessary for playing the game was acquired and packaged, the first evaluative component of the study was carried out. This facet involved a treatment or intervention through which anticipation skills were to be increased and an assessment of the effects of the treatment. The intervention consisted of having teachers play the anticipation game "Battle Chips." The prediction performances of these teachers were later contrasted, in the second evaluative component of the study, with a group of teachers who had played a game that was not designed to increase anticipation abilities.

Subjects. The subjects employed in this aspect of the study were 30 teachers of special class EMR children in the Cincinnati Public Schools. These teachers were those whose students' responses had been employed in gathering the normative data incorporated into "Battle Chips." The rationale behind using this group was that the normative data would be specifically relevant to them and, perhaps, provide them with new insights into how children in their own school system respond to questions which are curricularly pertinent. Also, if the experimental teachers would evidence greater understanding of their pupils (i.e., learn to anticipate more accurately) following the treatment and comparison to the control group teachers, the power of the intervention, as well as the notion of anticipation, would be dramatically demonstrated. This would especially be the case since the study was conducted near the end of the school year when teachers' "understandings" should have been optimal.

Through use of a random number table, teachers were randomly assigned, within their schools, to either an experimental or a control condition. Fourteen of the thirty randomly selected subjects were teachers in the five junior high schools and sixteen were teachers in the three senior high schools. The ages of all subjects ranged from 23 to 55 with a mean age of 34.7. The age range for control subjects was 24 to 53 with a mean of 45.9; the range for experimental subjects was 23 to 55 with a mean of 33.6. Eighteen of the teachers were male and twelve were female. Ten taught in self-contained classes and twenty taught in non-self-contained classes. All teachers possessed teaching certificates and all but three possessed certificates for teaching the mentally retarded.

In regard to their educational levels, one had not yet received a bachelor's degree, seventeen had bachelor's degrees, ten had master's degrees and two had master's degrees plus 30 or more credit hours of college course work. Almost all teachers had taken the following college courses: Introduction to Exceptional Children, Introduction to Mental Retardation, and Curriculum Methods for Teaching the EMR. However, only 17 out of the 30 teachers had student taught with EMR children.

The number of years the teachers had taught ranged from 1 to 20 with a mean of 7.5 years for all teachers. Experimental subjects had taught from 2 to 18 years with a mean of 6.4 years while the control subjects' years of teaching ranged from 1 to 20 with a mean of 8.6 years. All teachers had taught the mentally retarded from 1 to 15 years with a mean of 5.2 years. The corresponding means for teaching mentally retarded children were 5.1 and 5.3 years for experimental and control teachers respectively. Three of the thirty teachers indicated they did not own a copy of the Cincinnati Curriculum Guide for EMR pupils.

Procedure. Prior to initiating the treatment, teachers were contacted either by phone or in person to determine the best times for them to participate in playing their game. A schedule was then developed taking into account the times indicated by the teachers, and they were informed as to when the investigator would visit their school. Only one experimental teacher was required to go to another school to play. All others played within their own schools.

An occupational education coordinator employed by the Cincinnati Board of Education assisted the investigator in conducting the experimental and control subjects in playing the game. This individual completed a master's degree in special education and has worked with handicapped children for seven years. He was trained in the administration and play of both games and was coached to answer teacher's questions with only terse explanations indicating his unfamiliarity with the total nature of the study. This individual and the investigator monitored the play of all games and alternated between the two games in order to eliminate possible experimenter bias.

The control subjects were all engaged in playing a two-player game called "Perception" in order to counteract a potential Hawthorne effect. The commercially-made game involved the successive movements of different colored plastic pieces called "Quadrates" across a game board following the selection of one of three different colored "Tactiles." The game was selected because it did not entail predictions of responses of children, and, when stipulated that players record their own moves on paper, its credibility as an assessment of the teachers' playing strategies was sufficient to assuage the curiosities of the control-group teachers.

The procedure for playing the games was as follows. The investigator and his assistant arrived at a school at the time previously specified. In most instances, four teachers (two experimental and two control) would then be engaged in playing their respective games simultaneously. The investigator would monitor the play of two subjects, and his assistant would monitor the play of the other two.

Prior to the initiation of the game play, all teachers were given a questionnaire (see Appendix F) to fill out for the purpose of obtaining demographic data. Before playing both "Battle Chips" and "Perception," the instructions and rules for playing were read aloud by the game monitors while the participants read along. Players were then asked if they had any questions regarding the play of the game, and, if they did, the questions were answered. The subjects then began playing according to the rules for each game, and the game monitors assisted only when there were specific questions or problems or when a player accidentally eliminated one aspect of play. When monitoring "Battle Chips," close attention was paid to having both players indicate the question number and the age and IQ levels for which they were predicting during that round.

In the two schools where there were six teachers, the investigator and his assistant monitored the play of four of the teachers in the manner described above, and the investigator subsequently (on the same day or on the following day) monitored the other two subjects in their game. In the school where there was one experimental teacher and one control teacher, a teacher of a regular class was enlisted to play with the experimental teacher and a student teacher volunteered to play with the control teacher. Subjects engaged in playing the games from 25 to 45 minutes each, depending upon the amount of free time they had available.

At the termination of play (after each playing session) all subjects were requested not to discuss the game they played with anyone. They were told that summaries of the completed study would be made available to them, but until the study was finished, their help in not discussing the games with anyone, and especially not with their colleagues, would be appreciated. When asked about the nature of the study, the investigator would reply that one of its aspects was assessment of teachers' strategies in playing different games. This was generally sufficient to satisfy curiosity.

Due to the nature of the field testing mentioned above, it was thought that teachers would predict far more options than they did. If predictions had not been completed, the teachers were told when 30 seconds had passed following the reading of the Question Card; but, even then, some teachers still required approximately another half minute to a minute to determine and record their predictions. Therefore, some teachers responded to as few as eight questions during the first session. Because of this, a goal was established to have all teachers predict for 30 randomly-selected questions resulting in prediction of approximately 120 options for each teacher. A third treatment session for all teachers was proposed, but the inability of some teachers to participate precluded following this strategy.

Prior to each of the second and third game sessions, the investigator would review the response sheets from the first (and second) session(s) in order to determine the Question Cards for which the players had already predicted. These were removed from the Question Card deck prior to beginning the next session.

At the beginning of the second (and third) treatment sessions (held for all subjects on the same day of the week during the week following the first or second session), the rules for playing "Battle Chips" were quickly reviewed for the experimental subjects, and they were again given the opportunity to ask questions regarding the play. Most teacher dyads were able to predict for the 30 questions by the end of the second session in that the terse review of the rules and the teachers' familiarities with the game provided a longer playing time. A third session was scheduled for those teachers who were not able to predict for all 30 items by the end of the second session. Immediately following the last session for players of both "Battle Chips" and "Perception," the teachers were asked to complete a game opinionnaire. A copy of the opinionnaire can be found in Appendix G. Teachers were then asked to fill out a second questionnaire also (see Appendix H) which would reveal data relevant to their use of the Cincinnati curriculum guide.

Evaluating Transfer of Anticipation Skills--Factor Analysis

Instrument. Following the collection of the normative data and punching of the pupils' responses to the 70 questions onto IBM cards, the responses were factor analyzed as a basis for construction of a criterion measure. Factor analyses were performed using 5, 12, 13, 16, and 21 factors. Although the five-factor analysis did not account for the highest percent of the variance (27%), an item inspection led to its parsimonious selection as that having the most meaningful structure. The labels given to the five factors were: (1) Map Reading and Arithmetic, (2) Practical-Functional, (3) Spelling, (4) Synonyms, and (5) Number Usage. Items which had rotated factor loadings over .40 and which represented several areas of the curriculum were selected for inclusion in the criterion measure. The selected items can be found in Appendix I. Those items comprising each factor and their corresponding loadings can be found in Table 4.

Further support was later generated for the construction of the criterion measure when it was found that pupils of different age and intelligence levels responded differentially on items comprising this measure. Both older and higher IQ pupils selected the correct option of a question significantly more times than did their younger and less intelligent peers. The level of significance for these findings both exceeded the .01 probability level. Tables 5 and 6 summarize the analyses of variance which established that there were significant differences between the performance of these groups of children.

The task for all subjects on the criterion measure was to predict the responses that five high-IQ-level students and five low-IQ-level students from their own class (or classes) would give to each of the 20 questions obtained through the factor analysis (see Appendix I). The

TABLE 4

Factor Structure of 70-Item Normative Data Instrument[1]

Questions[2]	Corresponding Question on 20-Item Criterion Measure	Rotated Factor Loadings				
		Factor I Map Reading & Arithmetic	Factor II Practical Functional	Factor III Spelling	Factor IV Synonyms	Factor V Number Usage
2		.349	.025	.160	.113	-.098
3		-.043	.100	.330	.208	-.065
4	17	.176	-.151	-.028	.061	-.475*
5	1	.618*	-.018	.104	.080	-.120
6		.163	.038	-.106	.175	.180
7	9	.195	-.170	.518*	.147	-.071
8	10	.064	-.023	.663*	-.045	-.012
9	11	.067	.024	.545*	.117	.075
10	12	.007	.044	.643*	.057	-.037
11		.411	-.316	-.077	-.052	.208
13		.318	.031	.136	-.208	.029

TABLE 4 (cont.)

Factor Structure of 70-Item Normative Data Instrument[1]

Questions[2]	Corresponding Question on 20-Item Criterion Measure	Rotated Factor Loadings				
		Factor I Map Reading & Arithmetic	Factor II Practical Functional	Factor III Spelling	Factor IV Synonyms	Factor V Number Usage
14		.359	.156	.221	.104	.009
15	2	.455*	.021	.122	.145	-.242
16		.298	.149	.172	.206	.354
17		.313	.093	.376	-.101	-.108
18		.379	-.028	.162	.289	.257
19		.006	.127	.502	-.073	.063
20		.148	.129	.020	.162	.030
21		.364	.115	.104	.012	-.117
23		.182	-.061	-.016	.066	-.035
24	5	.132	.661*	.112	.069	-.048
25		.290	.048	.061	.112	.353

TABLE 4 (cont.)

Factor Structure of 70-Item Normative Data Instrument[1]

Questions[2]	Corresponding Question on 20-Item Criterion Measure	Rotated Factor Loadings				
		Factor I Map Reading & Arithmetic	Factor II Practical Functional	Factor III Spelling	Factor IV Synonyms	Factor V Number Usage
27		.339	.217	.248	.133	.243
28	6	-.002	.630*	.124	-.178	-.145
29		.081	.613	.009	.076	-.065
30		.346	.359	-.153	.040	.100
31		.391	.167	.093	.314	-.060
32	18	.329	.141	.180	.230	-.412*
33		.317	.170	.256	.041	-.023
34		.126	.251	.088	.257	-.096
35		.363	.145	.001	.108	-.127
36		.297	.353	.165	.041	-.090
38		.415	.018	-.010	-.080	-.207

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TABLE 4 (cont.)

Factor Structure of 70-Item Normative Data Instrument[1]

Questions[2]	Corresponding Question on 20-Item Criterion Measure	Rotated Factor Loadings				
		Factor I Map Reading & Arithmetic	Factor II Practical Functional	Factor III Spelling	Factor IV Synonyms	Factor V Number Usage
39		-.096	.399	-.141	.236	.046
40		.460	.180	.064	.013	-.066
41	13	.222	.041	.047	.566*	.111
42	14	.119	.053	-.011	.661*	-.067
43		.154	-.093	.261	.532	-.108
44	15	.026	.091	.249	.613*	-.111
45	16	.042	.025	-.099	.570*	-.221
47		.306	.332	-.027	.091	-.028
48		.437	.172	-.081	.239	.009
50		-.014	.241	.086	.141	.145
53		.251	.108	.032	.075	.070

TABLE 4 (cont.)

Factor Structure of 70-Item Normative Data Instrument[1]

Questions[2]	Corresponding Question on 20-Item Criterion Measure	Rotated Factor Loadings Factor I Map Reading & Arithmetic	Factor II Practical Functional	Factor III Spelling	Factor IV Synonyms	Factor V Number Usage
54	19	.149	.172	.032	.140	-.446*
55		.231	.370	.056	.153	.005
56	20	.149	.085	-.026	.040	-.539*
59		.436	.199	.023	.131	.079
60		.433	.095	-.004	.027	-.088
61		.292	-.037	.057	.040	-.237
62		-.028	.001	.007	.131	-.288
64	7	.119	.513*	.022	-.034	.058
65		.050	.187	.196	.035	-.397
66	8	.158	.457*	-.043	-.128	-.256
67	3	.461*	-.011	-.047	.082	.121

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TABLE 4 (cont.)

Factor Structure of 70-Item Normative Data Instrument[1]

Questions[2]	Corresponding Question on 20-Item Criterion Measure	Rotated Factor Loadings				
		Factor I Map Reading & Arithmetic	Factor II Practical Functional	Factor III Spelling	Factor IV Synonyms	Factor V Number Usage
68	4	.484*	.039	.053	-.145	-.177
69		.148	.159	-.205	-.049	-.236
70		.309	.091	-.036	.100	.066

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[1] Due to ambiguity of options, 12 questions were excluded from this analysis.

[2] See Appendix B

*Factor loadings of questions included in the criterion measure.

TABLE 5

Analysis of Variance Between the Number of Correct Options Pupils Selected for Criterion Measure Questions and Pupil Age

Source	df	MS	F
Younger vs. Older Age Groups (G)	1	418.637	48.23**
Error (G)	298	8.681	
Total	299	10.052	

**p<.01

TABLE 6

Analysis of Variance Between the Number of Correct Options Pupils Selected for Criterion Measure Questions and Pupil IQ

Source	df	MS	F
Low vs. High IQ Group (G)	1	185.653	19.620**
Error (G)	298	9.463	
Total	299	10.052	

**p<.01

children were selected randomly, within IQ levels, from the total homeroom class lists of the teachers. Some of the students selected in this manner had not, for several possible reasons, responded on the first administration of the 70-item test, and, therefore, the 20 questions used in the criterion measure were administered to them prior to obtaining their teachers' responses on the criterion measure. The form upon which the teachers made their criterion predictions can be found in Appendix J.

Procedures. During the last game session the teachers were told that the investigator needed to see them one last time the following week for approximately 20 minutes. Prior to having the teachers respond on the criterion, the names of the five high-IQ and five low-IQ children were randomly distributed and written on the ten spaces at the top of the criterion measure instrument. The criterion measures were administered on an individual basis--generally in the teachers' classrooms. The teachers were requested to read over the list of ten children and were asked if they had them all in class and if they were familiar with each child.

In one instance, a high school subject indicated that, although he did have all ten of the children in his homeroom, he had not had them in his classes since early in that school year. He mentioned that, at one time or another during the day, he did have all the eleventh-grade EMR students. Therefore, the investigator randomly selected from the population of eleventh-graders to obtain ten students with whom the teacher was familiar. Also, the composition of students in a few of the classes revealed less than five low-IQ-level students. In these cases, names were picked from other low-IQ-level students in the same school. In all instances, the teachers had taught these pupils in their classes.

The directions at the top of the criterion measure response sheet were then read aloud by the investigator while the teacher read along, and each teacher was told that the students had been encouraged to make a "good guess" if they were unsure of the correct response. It was also suggested that, if they predicted a child would not respond to a question with the correct option, they might have some difficulty in predicting which incorrect option the child would choose, but that, taking into account the child's characteristics, they should predict as well as possible the actual response he would choose. In general, teachers required between 15 and 30 minutes to complete their predictions on the criterion measure.

Following a teacher's response on the criterion measure he was asked to judge in which quartile in his class each of the pupils for whom he had predicted would fall in regard to general ability. The form of this measure is presented in Appendix K.

Scoring of Instruments

Following is a description of the manner in which the game play response sheets and the criterion measures were scored.

Game play Response Sheets. The predictions that experimental teachers made during the game play intervention were scored by subtracting teachers' predicted percentages from the actual percentages derived from the normative data for each option of questions for which predictions were made. The direction of the signs of the differences between the predicted and actual percentages were disregarded in obtaining these deviation scores. The deviation scores for the options of each question were then grouped.

Criterion measures. Criterion measure predictions were scored as correct if the teacher predicted the option which that particular pupil actually chose. The anticipation was considered accurate whether it was made for the correct option or the incorrect option of a question. In planning analyses of accurate predictions of the correct options of questions, the number of times each pupil chose the correct option, the number of times the teacher predicted the correct option for each pupil, and the number of times both the pupil chose and the teacher predicted the correct option were tabulated.

Analyses of Data

Testing the hypotheses involved several types of statistical procedures which were run on a CDC 6600 computer.

Anticipation skill development. Assessing the teachers' increases in anticipation skills as a function of the number of questions for which they made predictions (Hypothesis 1) was performed through a serial analysis of variance (7 x 3 repeated measures on trials using computer program ANOVAR). A 3 x 3 two-way analysis of variance was used to test the relationship between teaching experience and prediction accuracy during game play (Hypothesis 3). A one-way analysis of variance was employed in testing Hypothesis 4 regarding teachers' differential predictions of high and low IQ level pupils. Hypotheses 2, 5, and

6 were analyzed through a correlational analysis using computer program BMDO2D. Subsequent analysis of the relationship between sex and overestimates noted in the analysis of Hypothesis 6 was conducted through use of a Stepwise Multiple Regression Analysis (computer program SPSS).

Transfer of anticipation skills. Assessing the transfer of the obtained anticipation skills was performed using procedures similar to those used in evaluating the effects of the game play intervention. The anticipation accuracy comparison between experimental and control subjects (Hypothesis 7) was accomplished through a one-way analysis of variance (computer program ANOVAR). The direction of the hypothesis regarding differential prediction performances of teachers with self-contained or no self-contained classes (Hypothesis 8) was tested in the same manner as was Hypothesis 7.

Differences between teachers' criterion measure predictions for high- and- low IQ level pupils (Hypothesis 9) were tested using a 2 x 2 analysis of variance (computer program BMDO8V). A 2 x 5 analysis of variance was employed to test the differences between teachers' prediction accuracies on items comprising each of the five factors used in developing the criterion measures (Hypothesis 10). A planned comparison was done to test if there was a significant difference between the accuracies on the practical-functional component as compared to the other four components.

Hypothesis 11 regarding the relationship between teachers' prediction accuracies and their assessment of the general ability levels of the pupils for whom they were predicting was analyzed, first, through a correlational analysis using computer program BMDO2D. The relationship was then tested in a 2 x 2 analysis of variance employing computer program BMDO8V.

The differential prediction accuracies between female and male teachers (Hypothesis 12) were tested through a correlational analysis using program BMDO2D as was the relationship between criterion measure prediction accuracy and teacher variables listed in Hypothesis 13.

The above chapter was related to methods and procedures which were utilized to carry out the developmental and evaluative components of the current study, and, thus, test the hypotheses generated in Chapter III. This involved a discussion of the normative data collection, anticipation game development, assessment of anticipation skills by experimental teachers, and evaluation of the transfer of anticipation skills to prediction of pupil responses. The following chapter will consider the results of the study's findings which followed the implementation of the procedures described above along with a discussion of those findings.

CHAPTER V

RESULTS AND DISCUSSION

This chapter presents the analyses of data collected through the procedures outlined in Chapter IV. The results as shown in Table 7 will be discussed under two main headings which correspond to the two evaluation components of the study: assessing the efficacy of the treatment (game play) in increasing anticipation skills and evaluating the transfer of those anticipation skills to classroom-relevant anticipations.

Increasing Anticipation Skills

The evaluation of the intervention concerned only the 15 experimental subjects who received the intervention--playing the anticipation game of Battle Chips. Assessing the efficacy of Battle Chips in increasing anticipation skills involved analyses of teachers' deviation scores (predicted percentages minus actual percentages). In order to evaluate learning through the game play, the deviation scores were grouped temporally by combinations of the first, second, and third sets of ten questions for which each teacher predicted.

Based on the premise that there might have been an interaction between pairs of opponents, a 7 x 3 serial analysis of variance was performed on dyadically grouped player opponents. The probability of an interaction within player dyads was suggested by Inbar (1966), who studied the effects of game play on participants. He reported that the effect of the composite members of the playing groups was the major determinant of the impact of the game session upon the participants for both learning and enjoyment. In the present study, all of the teachers

TABLE 7

Summary of Results

Hypothesis	Analysis	Support	In Predicted Direction
Anticipation Skill Development			
H:1 Teachers playing the anticipation game increase significantly in their prediction accuracy as a function of the number of prediction trials in playing the game.	Serial analysis of variance (7 x 3 repeated measures on trials)	$p < .05$	Yes
H:2 A significant correlation exists between years of teaching experience and prediction skill when playing the game.	Correlational analysis	None	---
H:3 Teachers' predictions when playing the game are significantly more accurate when prediction responses for pupils of the age they are currently teaching than for other age levels.	3 x 3 two-way analysis of variance	None	---
H:4 Teachers are significantly better predictors of low IQ level EMR children than of high IQ level EMR children.	One-way analysis of variance.	None	---

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TABLE 7

Summary of Results (continued)

Hypotheses	Analysis	Support	In Predicted Direction
Anticipation Skill Development			
H:5 Significant correlations exist between teacher prediction accuracy during the game play intervention and teacher variables of: age, sex, type of class (self-contained or not self-contained), educational level, and impressions of the anticipation game.	Correlational analysis	None	---
H:6 When playing the game, prediction overestimates will be significantly correlated with the following teacher characteristics: age, sex, type of class, education level, and impressions of the anticipation game.	Correlational analysis	None	---
Transfer of Anticipation Skills			
H:7 Teachers who play the anticipation game when compared to control subjects, demonstrate significantly greater prediction accuracy in anticipating responses of children they teach.	2 x 1 analysis of variance	None	---

TABLE 7

Summary of Results (continued)

Hypotheses	Analysis	Support	In Predicted Direction
Transfer of Anticipation Skills			
H:8 Teachers who teach self-contained classes perform significantly better (i.e., are more accurate predictors) than those teachers who do not teach self-contained classes.	2 x 1 analysis of variance	None	---
H:9 Teachers are significantly better anticipators of low IQ level EMR children than of high IQ level EMR children.	2 x 2 analysis of variance	$p<.01$	No
H:10 Significant differences exist between teachers' predictions of the practical-functional component of the factor analytically derived criterion measure and the other four components with significantly better predictions by experimental than by control subjects.	2 x 5 analysis of variance and a planned comparison	$p<.05$	Yes

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TABLE 7

Summary of Results (continued)

Hypotheses	Analysis	Support	In Predicted Direction
Transfer of Anticipation Skills			
H:11 A significant negative relationship exists between teachers' prediction accuracies and their assessment of the general ability levels of children they teach.	Correlational analysis and 2 x 2 analysis of variance	$p<.01$	No
H:12 Female teachers demonstrate greater prediction accuracy than do males.	Correlational analysis	None	---
H:13 Significant interactions exist between teacher prediction accuracy and teacher variables of age, sex, type of class, educational level, impressions of the anticipation game, and supervisor's ratings of teacher performances.	Correlational analysis	None	---

except one were playing with teachers from their school which could have contributed to a school effect. In addition, it was thought that opponents might be most similar in their anticipation accuracies when compared to other groups of opponents due to the fact that their knowlege of their opponent's prediction accuracy might have influenced them to make predictions that were similar to those of their opponent.

It will be noted that a dyadic grouping of anticipation game players would result in one player being eliminated from the analysis. The player eliminated (subject number 201) was the subject in the school that only contained two teachers (one control and one experimental). He had played the anticipation game with a volunteer regular class teacher. As will be noted by reference to Appendix L the addition of his game anticipation performance to the analysis would only have contributed to more significant results in that he showed a progressive decrease in anticipation deviation scores from 570 to 549 to 468 for the first, second, and third sets of ten predictions respectively. Appendix L presents the raw deviation scores, with signs lacking, across 30 randomly-selected sequential questions for the 15 experimental teachers who played Battle Chips.

- Hypothesis 1. A serial analysis of variance used to test this hypothesis showed that significant ($p<.05$) learning accrued as a function of the number of questions for which predictions were made. The results of this analysis are presented in Table 8. Thus, the first hypothesis was supported lending further evidence to the findings of Semmel and Sivasailam, (1971); Oskamp, (1961); Newton, (1965); Thomas and Mayo (1957); and Imig, (1966) who showed that prediction skills

TABLE 8

Serial Analysis of Variance of Anticipation Game Play Deviation Scores by Pairs of Participants

Source	df	MS	F
Participant Pair Groups (G)	6	22307.10	1.060
Error (G)	7	21050.81	
Trials (T)	2	37577.17	4.500*
G by T	12	27912.64	3.343*
Error (T)	14	8350.10	
Total	41	19712.33	

*$p < .05$

can be developed through training designed to increase anticipation abilities. This finding is further supported by the fact that the analysis revealed no significant differences in the prediction accuracies between dyadic groups of players.

As Table 8 also reveals, there was a significant interaction effect obtained from the analysis of the participant dyads (groups) across the three grouped sets of ten questions (trials). This indicates that the anticipation percentage deviation scores of all player dyads did not decrease in a successive fashion from the first to the second and third sets of predictions as might have been suggested by an inspection of the mean deviation scores. In fact, the deviation scores of three of the player dyads increased from the first to the second set. In these cases, the subjects may have been making, in their second ten predictions, responses to questions of unfamiliar curricular content or their predictions may have been made for children of IQ and age levels other than those with whom they had experience.

Figure 2 shows the anticipation skill learning that occurred among the 15 players as a function of the game play treatment. The six points plotted were obtained in the following manner: The deviation scores of all players were summed for each of the 30 items and the mean of these scores was computed. It should be remembered that these deviation scores represent predictions of different questions for each set of players in that the Question Cards were selected randomly. The obtained mean deviation scores were then summed and divided by five and in this way six grand means were derived. The six grand means were then plotted in Figure 2, and it was through inspection of the means

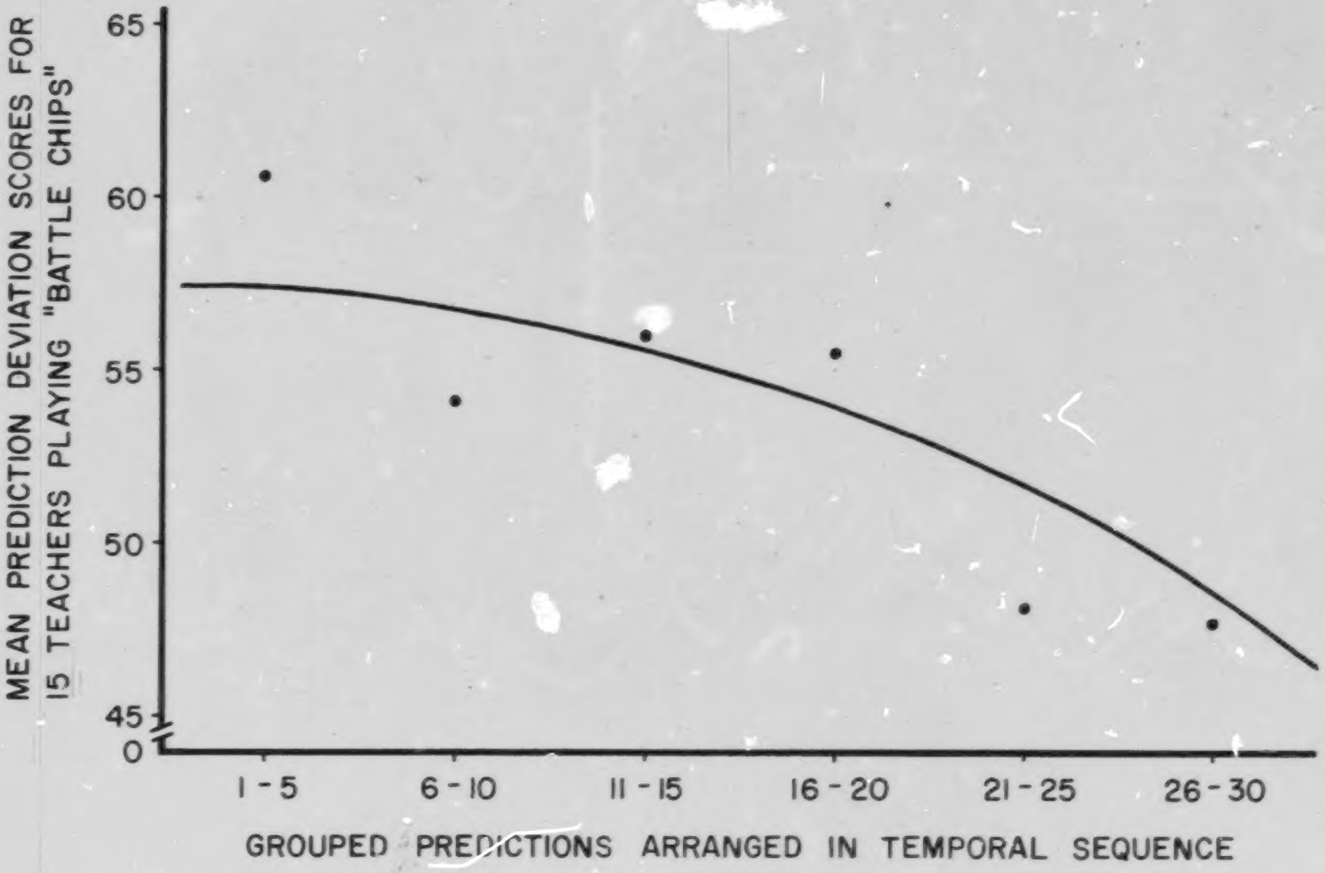

Figure 2

Best-Fit Curve Showing Decrease in Prediction
Scores as a Function of Anticipation Game Play

that the curve of "best fit" was drawn. Table 9 presents the mean prediction deviation scores for all 15 teachers for each of the 30 items.

Hypothesis 2. The relationship between teaching experience and prediction accuracy during the game was tested through a two-way analysis of variance, but the results did not support the hypothesized relationship. Thus, the findings did not support observations by Semmel, Garrett, D. Semmel, and Wilcove (1973), Melton (1953), and Kottmeyer (1947) who did find relationships between experience and prediction accuracy. The present finding is consistent with the results of Gronlund's (1950) study in which he was unable to find a relationship between the accuracy of teachers' judgments and their amount of teaching experience.

Hypothesis 3. The analysis of teachers' prediction abilities during the game play in regard to the age group they teach compared to children of other age groups were performed using a two-way repeated measures analysis of variance. There was a lack of significance both between and within groups, indicating that teachers of senior high students were not better at predicting, within the game play, normed responses of junior high school students. The same relationship existed for junior high school teachers. This finding is possibly a reflection of the relatively small number of predictions that teachers were able to make for the two age levels. Since the age levels were selected randomly, it is plausible that each teacher made predictions for approximately 15 questions for each age level. This may not have been

Table 9

Mean Deviation Scores for 15 Experimental Teachers
Across 30 Sequentially Arranged Questions

Question	$\overline{X}$ Deviation Score	Question	$\overline{X}$ Deviation Score
1	70.6	16	58.5
2	54.3	17	60.3
3	73.6	18	45.4
4	54.6	19	65.3
5	50.6	20	48.5
6	47.3	21	48.9
7	54.6	22	34.9
8	43.4	23	52.9
9	71.6	24	52.0
10	53.4	25	52.5
11	58.5	26	57.6
12	54.7	27	45.0
13	60.2	28	40.6
14	44.9	29	40.9
15	61.6	30	54.8

a sufficiently extensive intervention to reflect the teachers' understandings of the response characteristics of the age level of the students in their classes. It is also feasible that those high school teachers who taught specific subjects to EMR pupils randomly selected questions which were outside the content of their subject area. This situation might have led to more inaccurate anticipations relative to teachers who randomly selected questions which were within their subject area.

Hypothesis 4. In looking at teachers' differential predictions of high and low IQ level pupils during the treatment, a one-way analysis of variance showed that the required level of significance ($p<.05$) between predictions for the two groups was lacking. The result does not lend support to the findings of Semmel and Sivasailam (1971), Tyler (1968), Barnard, Zimbardo and Sarason (1968), Garrison and Tippett (1922), Averill (1923), Morrison (1924), Pressy and Long (1924), and Hubbard and Flesher (1953). This finding may also be due, as in the analysis of predictions of the two age groups, to the fact that since IQ levels were selected randomly, teachers may not have had sufficient opportunity to demonstrate their understanding of the response patterns of children with differing IQs.

Hypothesis 5. The suggested significant relationship between teacher prediction accuracy when playing the game and specified teacher variables was assessed through a correlational analysis which showed that none of the teacher variables examined were significantly correlated with teacher anticipation accuracy during the game play. This finding is somewhat consistent with the results of Gronlund's (1950) study in which he found no relationship between the accuracy of teachers' judgments and teacher age, number of semester hours and recency of college training, teaching experience, semester hours in education and psychology, size of their class, marital status, and length of contact with the class. It does not lend support to the prior findings of Gage, Leavitt, and Stone (1955) or Inbar (1966).

Interpretation of this finding seems to imply that it is probably difficult to ascribe specific characteristics to 'good' or 'poor' predictors within an anticipation game structure. Perhaps analysis of variables relevant to the personalities or performance characteristics of predictors, rather than analysis of demographic variables, would show more significant correlations with prediction accuracy.

Hypothesis 6. Analysis of relationships between over and underestimates and teacher prediction accuracy evidenced a correlation coefficient that closely approached the .05 level of significance. This indicated that male teachers tended to overpredict the normed responses of EMR children. Subsequently, overprediction and underprediction were entered as dependent variables in stepwise multiple regression analyses. Other variables entered into the regression analyses were: school level (junior or senior high), age, type of class (self-contained or not self-contained), teacher educational level, student teaching with EMR, years of teaching experience, years of experience teaching the mentally retarded, frequency of use of the Cincinnati Curriculum Guide for the EMR, and impressions of the anticipation game of Battle Chips. These analyses revealed that sex was the variable which accounted for the largest percent of variance for both overestimates (over 26%) and underestimates (over 22%). Although the obtained F ratio between sex and overestimation did not quite reach the level necessary for significance at the .05 level, it did seem to indicate that there is a tendency for males to overestimate the response performances of junior high and senior high school EMR pupils. The fact that the performances of only 15 subjects were entered into the regression analysis may have influenced the lack of more significant findings in the stated hypotheses.

Transfer of Anticipation Skills

The previous section showed that, as a function of the anticipation game treatment, teachers did, in fact, increase in their accuracy of anticipating responses of EMR children. Subsequently, a second evaluation phase tested the transfer of those acquired anticipation skills to teachers' predictions of responses of pupils in their own classes.

The assessment of teachers' prediction accuracies on the criterion measure involved considering as accurate teacher anticipations of the same options pupils chose regardless of whether or not the correct option was chosen. Based on the premise that teachers may have made differential predictions for all the options and for the correct option, the total numbers of correct options teachers anticipated and pupils chose were tabulated, and these were grouped according to low and high-IQ children. However, a correlational analysis indicated that these figures correlated highly ($r = .58$-$.87$) with the number of total accurate predictions. Therefore, most of the analyses of prediction accuracy on the criterion measure were based on the total accurate prediction score.

Hypothesis 7. Basically, the findings showed that the teachers were able to predict pupil responses with nearly 60% accuracy (the mean for all teachers was 57.7%). In fact, only four of the total population of 30 teachers anticipated with less than 50% accuracy. Table 10 presents the prediction accuracy percentages of experimental and control teachers. However, comparison of prediction performances of experimental and control subjects revealed no significant differences in their anticipation accuracies, thus rejecting Hypothesis 7. The implication, therefore, is that the anticipation skills developed through the anticipation game intervention did not transfer to teacher anticipations of responses of their own pupils.

Several possible explanations can be generated to account for the lack of significant differences between experimental and control group performances on the criterion measure. One reasonable rationale for this result appears to lie in the relatively short duration of the treatment. The fact that the experimental teachers were only able to predict for the options of 30 randomly selected questions suggests to the investigator that a more extensive treatment might have been effective in eliciting differences. Prior to the initiation of the intervention, the investigator had tested several of his colleagues in playing Battle Chips in order to determine amounts of time necessary for going over rules and for playing the game. However, it appears that the use of special class teachers would have been more appropriate for field testing purposes. This was noted when the teachers who played the game during the first evaluative aspect of the study were

TABLE 10

Experimental and Control Teachers' Criterion Measure Prediction Accuracy Percentages

Experimental Teachers		Control Teachers	
Teacher Number	Accuracy %	Teacher Number	Accuracy %
101	40	102	51
103	45	104	60
201	58	202	61
301	55	402	55
401	59	403	24
404	55	502	64
501	57	503	55
613	62	611	61
616	54	612	57
711	49	614	77
712	62	615	54
714	63	713	68
716	68	715	62
811	62	813	69
812	56	814	68
	$\overline{X}$ = 56.33		$\overline{X}$ = 59.07
	SD = 7.06		SD = 11.48

much slower both at going over the rules and at playing the game (even though an unwritten time limit was imposed) than had those who had participated in the field testing. Had teachers been used in the field testing, the need for a treatment of a longer duration might have been noted and implemented.

Even though every precaution was employed to avoid the influence of experimental teachers on control teachers, it is possible that interaction between these individuals during the game treatment phase may have had a leveling effect on the experimental teachers. This possibility is pronounced by the fact that both experimental and control teachers were selected from the same schools. This condition maximized their potential for interaction regarding the game treatment, although their cooperation in not discussing the nature of their respective games had been solicited.

Another plausible explanation for this lack of differences may be seen in the game play strategies of individual participants. Some players, it seems, were motivated to play the anticipation game because they felt they could learn more about retarded children. Others, however, were motivated more by a feeling of competition and a desire to win the game. The same differences in the bases of manifested motivation were noted in the Semmel and Sivasailam pilot study (personal communication). A player who was interested in winning the game, regardless of whether or not he learned about retarded children, might always select a strategy through which he felt he could acquire the most chips. This might have taken the form of consistently predicting the 90th or 95th percentile for the correct option of a question for older and/or higher IQ pupils regardless of the complexity or curricular area of the question selected. Although it would be dependent upon the Question Cards, which were randomly selected, this strategy may have proven successful in the form of the number of games won. However, learning of the response patterns of EMR children could have been minimal, and this factor could have influenced the experimental subject's inaccuracy in predicting responses of the children he was teaching.

Furthermore, it seems likely that by the time the game treatment was initiated, the teachers had already developed certain expectations of their pupils' behaviors. Such expectancies might have been based upon information from cumulative records and verbal communications from the students' previous teachers as well as from the actual performances of the pupils during that academic year. Experimental teacher anticipations of their pupils' response behaviors may, therefore, have been based on their relatively global expectancies, and the anticipation game play may have been incapable of providing them with information that would modify their already established expectations. Some teachers, on the other hand, might view the learner from an idiographic perspective or one that analyzes behavior on an individual basis rather than a nomothetic perspective which examines behavior from a normative standpoint involving the comparison of one individual to a number of other individuals (Stern, 1963). Such teachers might tend to ignore any data not related specifically to the individual child and, thus, might not be influenced by their anticipation game play.

Hypothesis 8. Testing of this hypothesis showed that teachers of self-contained classes did not perform significantly better in anticipating criterion measure items than did teachers of non-self-contained classes. This finding suggests that the quantity of time spent interacting with a child would not necessarily lead to a better prediction of his responses to items similar to those employed in the criterion measure. A possible alternative explanation for the obtained result is that, since the study was initiated near the end of the academic year, the teachers' "understandings" of their pupils might already have reached their asymptote due to almost nine months of interaction whether the teacher taught a self-contained class or not. This condition could account for the nonsignificance of differences between these two groups.

Hypothesis 9. The results of the analysis of teachers' differential prediction accuracies of low and high-IQ-level EMR pupils showed that, on the criterion measure, teachers were significantly better anticipators of high IQ level pupils. The results of the analysis of variance used to test the hypothesis are presented in Table 11. As will be noted in Table 11, the findings provided additional validity by the lack of a significant interaction between IQ and teachers. This result is opposite the direction of that hypothesized. Thus, it contradicts the finding by Semmel and Sivasailam (1971), who found it was easier to predict responses of low-IQ-level EMRs. However, in their pilot study, Semmel and Sivasailam employed only a single subject who played a series of games, and the present study used a much larger

TABLE 11

Analysis of Variance of Experimental and Control Teachers' Accurate Criterion Predictions of Low and High IQ Level EMR Pupils

Source	df	MS	F
IQ	1	182.52	13.871**
Teachers	29	37.76	2.870**
IQ x Teachers	29	18.04	1.371
Students (IQ x Teachers)	240	13.158	
Total	299	16.58	

** $p < .01$

sample. The results lend support to the findings of researchers who have found relationships between predictions of pupil behaviors and pupil mental maturity and IQ (Tyler, 1968 & Barnard, Zimbardo, & Sarason, 1968).

The above finding may be attributed to the fact that the classes of the teachers who were subjects in the study are constituted of a much larger percentage of high-IQ-level students than of low-IQ-level students. This fact is reflected in the sample of children used in acquiring the normative data. Ninety-nine and 191 pupils had low and high IQ levels respectively. This phenomenon may be due to the propensity for lower-IQ-level EMRs to drop out of school or to be channeled into other educational programs prior to junior or senior high school. The IQ distribution of the sample may also be seen as consistent with the distribution of intelligence in the general population--decreasing numbers with increasing deviation from the mean. Because the teachers interacted with larger numbers of EMR pupils, they had a better opportunity to "understand" them and thus would probably be more accurate at anticipating their responses.

Hypothesis 10. The analysis of findings pertinent to this hypothesis revealed that there were significant differences between teachers' prediction accuracies between questions comprising the five factor analytically derived components of the criterion measure. The results of this analysis are presented in Table 12. A planned comparison revealed that the teachers were significantly better at predicting questions comprising the practical-functional component than the other four components. The mean prediction accuracy scores for each of the

TABLE 12

Analysis of Experimental vs. Control Teachers' Criterion Prediction Accuracies for the Five Factor Analytically Derived Criterion Measure Components

Source	df	MS	F
Experimental vs. Control Group (G)	1	43.74	.567
Error (G)	28	77.16	
Factors (F)	4	1348.76	
¼ (Syn. + Spell. + Map Rdg. + Arith. & No. Use) < Pract. Funct.	1	228.78	11.02*
G x F	4	10.07	.485
Error (E)	112	20.760	
Total	149	66.8	

*$p<.05$

components are presented in Table 13. Thus, this finding supports the the rationale presented for Hypothesis 10.

Hypothesis 11. A significant correlation was found between teachers' prediction accuracies and their assessment of the general ability levels of the pupils for whom they were anticipating. The correlation coefficient obtained (with 298 degrees of freedom) was .583 which was significant beyond the .01 probability level. However, this correlation was positive rather than negative as had been hypothesized. This finding is consistent with the result that showed superior teacher prediction of higher IQ-level-EMR children's responses. Inasmuch as teachers were shown to be better predictors of higher-IQ-level EMRs, it would follow that they would also be better able to assess levels of higher IQ pupils. The above relationship is based on the assumption of a positive correlation between general ability and IQ.

Hypothesis 12. An analysis of variance between the relative prediction abilities of male and female teachers on the criterion measure showed that there were no significant differences between the anticipation performances of these two groups of teachers. This finding, therefore, does not support results of the Semmel, Garrett, D. Semmel, and Wilcove (1973), and Gage, Leavitt, and Stone (1955) studies which found that female subjects were superior predictors to males.

Analysis of the relationships between teacher prediction accuracy on the criterion measure and teacher variables of age, sex, type of class, educational level, and impressions of the anticipation game resulted in a lack of significance among all of the correlations. This finding, therefore, does not lend support to the research results

TABLE 13

Mean Teacher Prediction Accuracy Scores for Questions Comprising Each of the Five Criterion Measure Factors*

Factor Name	$\overline{X}$ of Accurate Prediction
Map Reading and Arithmetic	17.667
Practical Functional	32.133
Spelling	24.033
Synonyms	25.667
Number Usage	15.267

*Questions included in each factor can be found by referring to Table 4 and Appendix B.

of Smith (1969), Gage, Leavitt, and Stone (1955), and Inbar (1966) who found relationships between prediction accuracy and selected teacher variables. It does support the finding of Gronlund (1950) who found very few relationships between a number of demographic variables and teachers' anticipations of pupil performances.

Summary

The above described results have shown that the anticipation game treatment employed in this study was effective in developing anticipation skills in the teachers who constituted the experimental group. However, it was also shown that these anticipation skills did not transfer to teachers' anticipations of responses of children in their own classes. Several possible explanations of the lack of significant differences between control and experimental groups were proposed.

It was also found that, on the criterion measure, which required teachers to predict responses of randomly selected children in their own classes, teachers were better predictors of high-IQ-level EMR children than of low IQ level EMR children. Although opposite the hypothesized direction, the plausibility of this finding was entertained. A finding of a significant positive relationship between teachers' prediction abilities and their assessments of the general ability levels of their pupils also was in the direction opposite to that hypothesized.

It was found that teachers were better predictors of pupil responses to questions of a practical-functional nature than to questions dealing with school types of learning. No significant relationships were found between teachers' accuracies of prediction either during the game play or on the criterion measure and specified teacher variables. The following chapter considers the implications of the results presented and discussed above.

CHAPTER VI

IMPLICATIONS

The previous chapters have described the problem investigated, literature related to the problem, hypotheses to be tested through the study, procedures employed to test the hypotheses, and the results generated from the implementation of those procedures. The present chapter will be concerned with the implications of the results discussed in Chapter V and the significance of the attainment or lack of attainment of the objectives of the study.

A simple flowchart paradigm was developed toward facilitating the presentation of some of the implications of the results. Figure 3 depicts the means by which both the assessment of effectiveness of training and the validity of the specified objectives were examined. The primary objective of this study was to train teachers to anticipate in a more accurate manner responses educable mentally retarded children make to specified questions. The rationale underlying this objective was that teacher skill in anticipating pupil response behaviors could contribute to teachers' understandings of children in their classes.

As can be noted from reference to Figure 3, the development and effectiveness testing of a treatment are first steps toward establishing the validity of a particular objective. The treatment in the present study entailed having the experimental group teachers play an anticipation game which was to make them become more accurate predictors of EMR pupil behaviors, and it was operationally viewed as contributing to the teachers' understandings of their own pupils. The intervention did prove to be effective in that the experimental group teachers

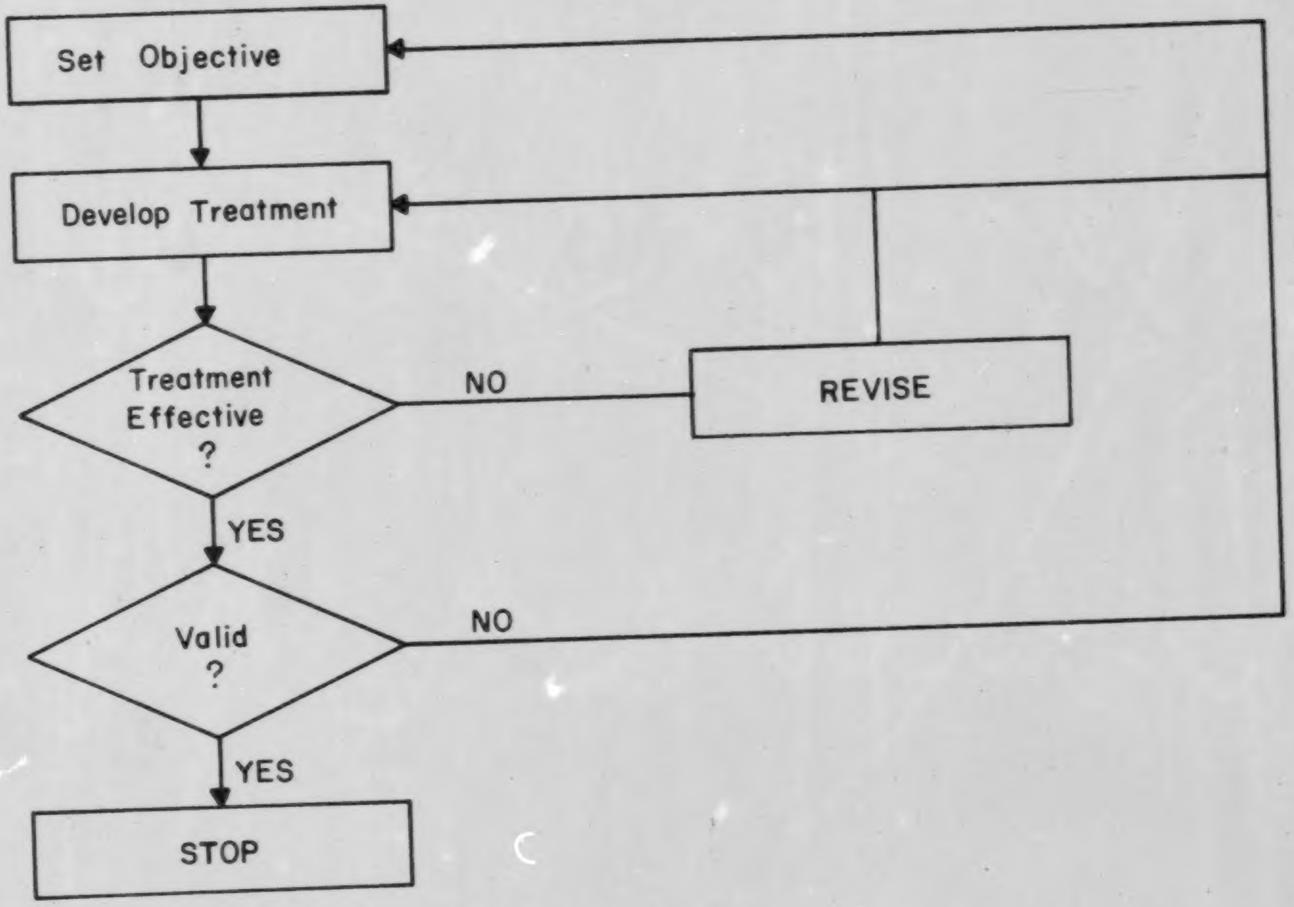
Set Objective
Develop Treatment
Treatment Effective ?
NO
REVISE
YES
Valid ?
NO
YES
STOP

Figure 3

Model for Assessing the Validity of a Specified Objective became more accurate in their anticipations of the responses of educable mentally retarded children as a function of the number of rounds of the anticipation game that they played. Thus, the implication is that anticipation abilities are amenable to development via a game format. This, in turn, supports a body of literature which advocates the use of simulation and gaming techniques in teacher education.

The subsequent step in the model is the assessment of the validity of the objective which, in the present study, was evaluated by comparing the performances of experimental and control teachers in their anticipation of responses of children they teach. This objective was not proven valid inasmuch as the differences in the criterion prediction abilities between the two groups was nonsignificant. According to the model presented in Figure 3, then, it is necessary to modify either treatment or the original objective or both.

The discussion in the previous chapter brought out some developmental and methodological problems in the treatment procedures which may account for the fact that the anticipation skills developed in the teachers did not transfer to their classroom predictions. Another question of concern regards the potential of training anticipation through the principles underlying the procedures employed in this investigation. One such questionable principle involves the use of feedback data in the form of percentages through which teachers were to transfer to predicting responses of individual children. In illustrating one facet of this problem, it can be pointed out that the data from which the percentage figures were derived were gathered on many children whose age and IQ levels differed from the students in each teachers' class. Therefore, if a preponderant number of subjects in the normative sample varied significantly in their ages and intellectual characteristics from the students in a teacher's class, his or her anticipation skill learning based on that normative data might lead to better understandings of a large sample of children in the total pool but not necessarily to better understandings of children in his own class.

Furthermore, response feedback data based on percentages may not be amenable to use with EMR children due to the wide variability in the abilities, skills, and response patterns of these children--a characteristic which has often been attributed to the EMR population. This consideration raises the question of the relative merits of viewing behavioral analysis from either an idiographic or a nomothetic perspective (Stern, 1963) as was suggested in the previous chapter. The former term implies an analysis of behavior on an individual basis, whereas the idiographic approach would examine behavior from a normative standpoint or one which involved the comparison of an individual to a number of other individuals.

The present study used a nomothetic approach in that the data were obtained by grouping responses of a large number of EMR children. However, the wide variance in performance characteristics of EMR children within a single classroom may preclude the efficacy of this strategy. Perhaps future research on anticipation should employ data based on responses of children within a single class which, when incorporated into a treatment, would result in a teacher's ability to predict his pupils' responses. Thus, he would better learn to understand those pupils from an idiographic perspective. Furthermore, the use of age and IQ normative data may not be meaningful as prediction criteria when this variation within the EMR population is taken into account.

Another question which arises concerns the nature of the game through which the treatment intervention was implemented. Although, as was pointed out above, the game format was effective in developing the desired skills, the fact that they did not transfer to the teachers' classroom behaviors implies that a game with a different format might be effective in leading to the goal of transfer. Future anticipation studies should, therefore, consider alternative game formats.

In regard to possible modification of the objective of the study, suggested in Figure 3, the results may be implying that it is very difficult to provide teachers with new "understandings" of their pupils once they have begun working with them. As was mentioned in the previous chapter, the general expectations that teachers acquire of their pupils may prevent them from incorporating new information into their behavior repertoires. Thus, future anticipation research might be conducted with teacher trainees who have not had the opportunity to establish expectancies of pupil behaviors.

One of the findings discussed in the previous chapter implied that male teachers may have a tendency to overestimate the response performances of junior and senior high EMR students. Future studies should be designed to assess this phenomena in a more comprehensive manner than was accomplished in the current investigation. The results of the study also revealed that teachers were more accurate anticipators of high-IQ-level EMRs than they were of low-IQ-level EMR students. If future research can substantiate this finding, the differential response patterns of high- and low-IQ-level EMR children should be examined in depth as well as the rationale behind why teachers are better predictors of one ability group than they are of the other.

CHAPTER VII

SUMMARY

The primary purpose of this study was to investigate the effectiveness of a treatment designed to develop teachers' understandings of educable mentally retarded pupils, defined operationally as their ability to anticipate or predict response behaviors of junior and senior high school EMR students. The primary components of this overall goal included, first, the development and evaluation of anticipation skills through a treatment implemented via a game format and, second, assessment of the transfer of those skills to classroom related anticipations of pupil responses.

The investigator hypothesized that teachers who played the anticipation game (experimental group) would become more precise in their prediction accuracy as a function of the number of predictions they made while playing the game. It was also expected that, for those teachers who constituted the experimental group, significant relationships would be noted between their prediction accuracy and years of teaching experience, age, sex, type of class (self-contained or not self-contained), educational level, and impressions of the anticipation game. Other hypotheses concerning the effect of the actual game play suggested a significant positive correlation between teachers' predictions for the age level students they were engaged in teaching and the age levels of the pupils for whom they were predicting, a significant negative correlation between teacher prediction accuracy and the IQ level (high or low) of the EMR children for whom they were anticipating, and significant correlations between anticipation overestimates with teacher characteristics of age, sex, type of class, educational level, and impressions of the anticipation game.

Hypotheses were also generated relative to teachers' performances on the criterion measure which examined the transfer of the anticipation skills developed through the treatment to classroom-relevant anticipations. It was expected that the experimental group teachers would demonstrate greater prediction accuracy when anticipating responses of ten randomly selected children from their own classes (the criterion) than would the control teachers who had played a game which was not designed to increase anticipation accuracy. It was also anticipated that teachers of self-contained classes would perform better on the criterion measure than would teachers who did not have self-contained classes, that teachers would be more accurate anticipators of low than high IQ level EMR children, and that teachers' prediction accuracies would be negatively correlated with their assessment of the general ability levels of children in their classes.

Furthermore, it was predicted that female teachers would evidence greater prediction accuracy when predicting responses of their own pupils than would males, teachers would respond differentially to the practical-functional component than to the other four components of the criterion measure with experimental teachers demonstrating significantly more accurate predictions, and that anticipation accuracy on the criterion measure would interact significantly with teacher variables of age, sex, type of class, educational level, impressions of the anticipation game and supervisor's ratings of teacher performance.

The overall study was comprised of two developmental components and two evaluative components. The first developmental component involved obtaining a body of normative data through the administration of a test of 70 curricularly relevant items to 290 educable mentally retarded pupils in junior and senior high school special classes in Cincinnati, Ohio. The responses to the 70 questions were grouped according to characteristics of the students: lower and higher IQ levels (50-65 IQ and 66-80 IQ respectively) and younger and older age levels (chronological ages 13-15 and 16-19 respectively). Subsequently, data on the appropriateness of responses of students for each of these four categories were grouped for each question and transformed into percentages. The percentage data were, in turn, incorporated into the second developmental phase of the study--the design and construction of an anticipation game which was named "Battle Chips."

Following completion of the above two developmental components, the first evaluative phase of the study was initiated. The research design used to implement this aspect required the selection and random division into two equal groups of 30 junior and senior high school special class teachers in the Cincinnati Public Schools. The 15 teachers who constituted the experimental group played, in from two to three game sessions, 30 rounds of the anticipation game described above. In order to counteract a potential Hawthorne effect, the 15 teachers comprising the control group also were engaged in playing a game, but their game was not designed to develop their abilities to anticipate pupil responses. The second evaluative component of the investigation entailed the prediction by both experimental and control group teachers of the responses of five "high" IQ and five "low" IQ children selected randomly from their own classes to 20 curricularly relevant questions.

Analyses of the obtained data revealed that, within the context of the anticipation game, dyadically grouped experimental group teachers increased significantly in their prediction accuracies as a function of the number of rounds they played. Thus, they did "learn" to become more precise anticipators through participating in the intervention. However, no relationship was found between teaching experience and prediction accuracy, there were nonsignificant differences between junior and senior high school teachers' predictions of the responses of "older" and "younger" children, and teachers who played the anticipation game were not found to be better predictors of low-than of high-IQ-level students. Also, the teacher variables examined were, for the most part, unrelated to prediction accuracy within the game context. In looking at the sex of experimental group teachers, however, a multiple regression analysis of their over and underprediction estimates suggested that males had a nonsignificant tendency to overestimate the response performance of junior and senior high EMR pupils.

The analysis of the transfer of anticipation skills to classroom pertinent anticipations, as was assessed in the second evaluative phase of the study, revealed that all the teachers were able to predict pupil responses with nearly 60% accuracy. However, the anticipations of experimental and control teachers were not significantly different, thus indicating that, although the intervention had developed the anticipation skills of the experimental teachers, those skills did not transfer to their in-class anticipations of their own pupils.

Additionally, teachers of self-contained classes were not found to be more accurate anticipators than teachers of non-self-contained classes as had been hypothesized. Analysis of the criterion measure performances of all 30 teachers revealed that they were significantly better predictors of high-IQ-level EMR students than of low-IQ-level EMRs. The results of a planned comparison showed teachers to be more accurate in anticipating pupil responses to items comprising the practical-functional component than the other four components of the factor analytically derived criterion measure. Also, contrary to one hypothesis, a significant positive correlation was obtained between teachers' prediction accuracies and their assessment of the general ability levels of the pupils for whom they were anticipating. Male and female teachers were not found to be significantly different in their anticipation performances on the criterion measure, and correlational analyses indicated that teacher variables of age, sex, type of class, educational level, and impressions of the anticipation game were unrelated to criterion measure accuracy.

Several explanations were suggested which could have accounted for the lack of differences between the criterion measure performances of experimental and control group teachers. These included the short duration of the treatment, the possible interaction between experimental and control teachers while the treatment was in progress, the fact that some participants may have employed game play strategies which would not lead to optimal anticipation skill development, and the observation that some teachers might analyze pupil behavior from only an idiographic or individual perspective and thus would not be influenced by normative data.

Discussion of the implications of the findings led to an examination of the objectives of anticipation training. Comments centered on the potential problems in the methods for developing anticipation skills and factors limiting their implementation. It was suggested that developing anticipation abilities in teachers may still be an objective worthy of pursuit, and that it may have the potential for contributing to teachers' understandings of their pupils. It was further suggested that anticipation accuracy might be best developed through an idiographic approach rather than a nomothetic strategy or one based on normative data. Additionally, the thought was posited that future research should consider, in addition to games, other methods of developing anticipation abilities.

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APPENDICES

CINCINNATI PUBLIC SCHOOLS
Education Center
230 East Ninth Street Cincinnati, Ohio 45202

April 13, 1972

R. Bruce Baum
120 Kingston Place Apt. 16
Bloomington, Indiana 47401

Dear Sir:

Your application to study "The Efficacy of an Anticipation Game in Increasing Teachers' Understanding of Educable Mentally Retarded Children" has been reviewed by the research committee and approved. Mr. William Penn has been named as a contact person. Please address requests for further assistance to Mr. Penn. Mr. Penn can be reached at the Education Center 230 E. Ninth Street, Cincinnati, Ohio 45202.

We will expect a copy of your research report when you have completed your study. Consideration will be given to publication in the Journal of the Division of Program, Research and Design.

Sincerely yours,

E. Jane Mueller

E. Jane Mueller, Chairman
Research Review Committee
Program Research and Design

EJM:mh

Telephone (1-513) 621-7010

APPENDIX B

70-ITEM TEST USED IN COLLECTING NORMATIVE DATA

DIRECTIONS: Read each of the questions below. Then pick the answer which you think is the right answer. Put a circle around the letter of that answer. You can use paper and pencil to work arithmetic problems.

1. When buying clothes, you should be sure they

   a. look pretty
   b. cost a lot
   c. are from a good store
   d. fit

2. If some groceries cost $14.21 and you give the clerk a twenty dollar bill, how much change should you get back?

   a. $4.62
   b. $7.98
   c. $6.10
   d. $5.79

3. To keep our bodies in good shape we should

   a. eat potatoes
   b. read
   c. exercise
   d. visit friends

4. Which of these is the longest amount of time?

   a. 100 days
   b. 7 months
   c. 20 weeks
   d. one-half year

5. Which of these is an odd number?

   a. 2
   b. 5
   c. 4
   d. 10

6. An instrument that has strings is called a

   a. guitar
   b. clarinet
   c. trumpet
   d. drum

APPENDIX B (cont'd)

70-ITEM TEST USED IN COLLECTING NORMATIVE DATA

In 7-11 below, put a circle around the letter of the word that is spelled wrong.

7.
a. for
b. smell
c. stor
d. eaten

8.
a. meals
b. lunch
c. bear
d. hott

9.
a. hurry
b. stay
c. frosen
d. gift

10.
a. glad
b. cake
c. rane
d. speak

11.
a. desert
b. too
c. plow
d. airplan

12. If you ride a bike at night you should have

a. a horn
b. handle bars
c. racing tires
d. a light

13. To borrow money you need what is called

a. budget
b. expense
c. credit
d. guarantee

14. The first Americans to fly in an airplane were the

a. Smothers Brothers
b. Smith Brothers
c. Wright Brothers
d. Marx Brothers

APPENDIX B (cont'd)

70-ITEM TEST USED IN COLLECTING NORMATIVE DATA

15. Bob has a dog 1 foot tall. How many inches tall is the dog?

a. 2
b. 6
c. 12
d. 10

16. A compass helps us tell the

a. time
b. fortune
c. wind speed
d. direction

17. Someone who has a job of painting pictures is called

a. a carpenter
b. an artist
c. a mason
d. a sculptor

18. A first-aid kit should always have

a. band aids
b. a pencil
c. matches
d. butter

19. Candy and sugar are bad for your

a. nails
b. teeth
c. eyes
d. hair

In 20 and 21 below circle the letter of the sentence with a mistake in the use of words.

20. a. We saw the car begin to move.
b. Bill had selled all his rabbits.
c. These shoes are too tight.

21. a. There weren't no ice on the road.
b. This ring won't come off.
c. Jane and I can carry out the job.

APPENDIX B (cont'd)

70-ITEM TEST USED IN COLLECTING NORMATIVE DATA

22. Before going shopping for food, it is a good idea to

    a. exercise
    b. watch T.V.
    c. check the newspaper
    d. take a nap

23. In football you score by getting the ball into the

    a. net
    b. end zone
    c. goal
    d. home plate

24. If you want to go out on dates, it is a good idea to

    a. sit home alone most of the time
    b. watch a lot of T.V.
    c. go places where you can meet people
    d. talk about other people behind their backs

25. When there is a lot of dirt in the air, we say there is a lot of

    a. attention
    b. electricity
    c. disease
    d. pollution

26. To find a good job today people need

    a. a new car
    b. good looks
    c. a high school education
    d. a pen and pencil set

27. The part of the newspaper to look in to find a job is the

    a. comics
    b. T.V. page
    c. help-wanted page
    d. front page

28. When you get a cold, you should

    a. take a shower
    b. smoke cigarettes
    c. take aspirin
    d. eat cookies

APPENDIX B (cont'd)

70-ITEM TEST USED IN COLLECTING NORMATIVE DATA

In 29-31 below circle the letter of the word that would come first in the dictionary.

29. a. run
    b. cat
    c. about
    d. every

30. a. done
    b. giraffe
    c. house
    d. far

31. a. bear
    b. bring
    c. bottle
    d. bat

32. If you bought a bag of candy for 37¢ and paid for it with a dollar bill, how much change would you get back?

    a. 21¢
    b. 84¢
    c. 63¢
    d. 71¢

33. One of the big political parties is called the

    a. Principal
    b. National
    c. Republican
    d. Commission

34. How many hours are there from 10:00 a.m. to 5:00 p.m.?

    a. 17
    b. 5
    c. 15
    d. 7

35. Feelings like love, hate and anger are called

    a. actions
    b. emotions
    c. notices
    d. edges

APPENDIX B (cont'd)

70-ITEM TEST USED IN COLLECTING NORMATIVE DATA

36. To have fun many people read

    a. dictionaries
    b. telephone books
    c. comics
    d. order blanks

37. Football, baseball, tennis and basketball are all called

    a. socials
    b. occupations
    c. sports
    d. races

38. When you plan out how you will spend your money, you have planned

    a. an expense
    b. a connection
    c. an account
    d. a budget

39. From what animal do we get ground beef?

    a. pig
    b. lamb
    c. horse
    d. cow

40. Something that can burn easily is called

    a. flammable
    b. electrical
    c. punctual
    d. model

In 41-45 below put a circle around the letter of the word that means the same as the first word.

41. couple

    a. four
    b. three
    c. two
    d. five

42. spoiled

    a. spilled
    b. eaten
    c. no good
    d. very cold

APPENDIX B (cont'd)

70-ITEM TEST USED IN COLLECTING NORMATIVE DATA

43. repair

a. fix
b. break
c. lend
d. return

44. quickly

a. quietly
b. fast
c. later
d. right

45. return

a. stay
b. leave
c. dream of
d. go back

46. A person who votes, does not break the law and is interested in his country is called a good

a. governor
b. lawyer
c. employer
d. citizen

47. About how many feet tall is the doorway in most homes?

a. 1 foot
b. 3 feet
c. 7 feet
d. 11 feet

48. Which number is the least?

a. 1,231
b. 423
c. 295
d. 1,001

49. If you buy something and find when you get home that it was broken when you bought it, you should

a. throw it out
b. cry
c. take it back
d. tell a friend

APPENDIX B (cont'd)

70-ITEM TEST USED IN COLLECTING NORMATIVE DATA

50. When water freezes, it gets

    a. larger
    b. warmer
    c. smaller
    d. softer

51. When you get mad at another person it is best to

    a. go to a bar
    b. talk to someone about why you are mad
    c. hit the person you are mad at
    d. wait for the day when you can get even

52. When a person stands up and sits with his back straight, we say he has good

    a. manners
    b. grooming
    c. posture
    d. diction

53. A word that means free time is

    a. busy
    b. treasure
    c. entertain
    d. leisure

54. Six quarters and fifteen dimes is the same as

    a. $2.00
    b. $3.00
    c. $4.00
    d. $5.00

55. In an emergency you should try to be

    a. calm
    b. nervous
    c. scared
    d. noisy

56. How would you write 29 in Roman numerals?

    a. XVIII
    b. XXIX
    c. XIX
    d. XXIV

APPENDIX B (cont'd)

70-ITEM TEST USED IN COLLECTING NORMATIVE DATA

57. For food and clothing men depend on animals and

    a. schools
    b. plants
    c. highways
    d. cars

58. You can find out about jobs by looking

    a. around
    b. in Life magazine
    c. in newspapers
    d. in barns

59. Another word for the pimples teenagers get is

    a. a rash
    b. acne
    c. blisters
    d. corns

60. The sixteenth president of the United States was

    a. Lincoln
    b. Johnson
    c. Washington
    d. Nixon

61. How would you write the time for ten minutes to nine in the morning?

    a. 9:10 p.m.
    b. 8:50 a.m.
    c. 9:10 a.m.
    d. 8:50 p.m.

62. In setting a table for dinner, the fork goes on the

    a. top
    b. right
    c. left
    d. bottom

63. At night it is best to wear

    a. red
    b. white
    c. green
    d. blue

APPENDIX B (cont'd)

70-ITEM TEST USED IN COLLECTING NORMATIVE DATA

64. The paper you fill out so you can get a job is called

    a. an application
    b. a communication
    c. a check
    d. an order

65. Which addition exercise below has the wrong answer?

    a. 7 + 6 = 13
    b. 8 + 3 = 10
    c. 3 + 4 = 7
    d. 2 + 9 = 11

66. In the United States, to work people have to have a

    a. Union Card
    b. Identity Card
    c. Social Security Card
    d. Immigration Card

Questions 67-70 refer to the map on the following page. Look at the map before answering these questions.

67. What is at the corner of Oak Street and H. Street?

    a. the hotel
    b. the school
    c. the police station
    d. the ice cream store

68. In what direction would you be walking if you were going from the playground to the movie?

    a. east
    b. south
    c. north
    d. west

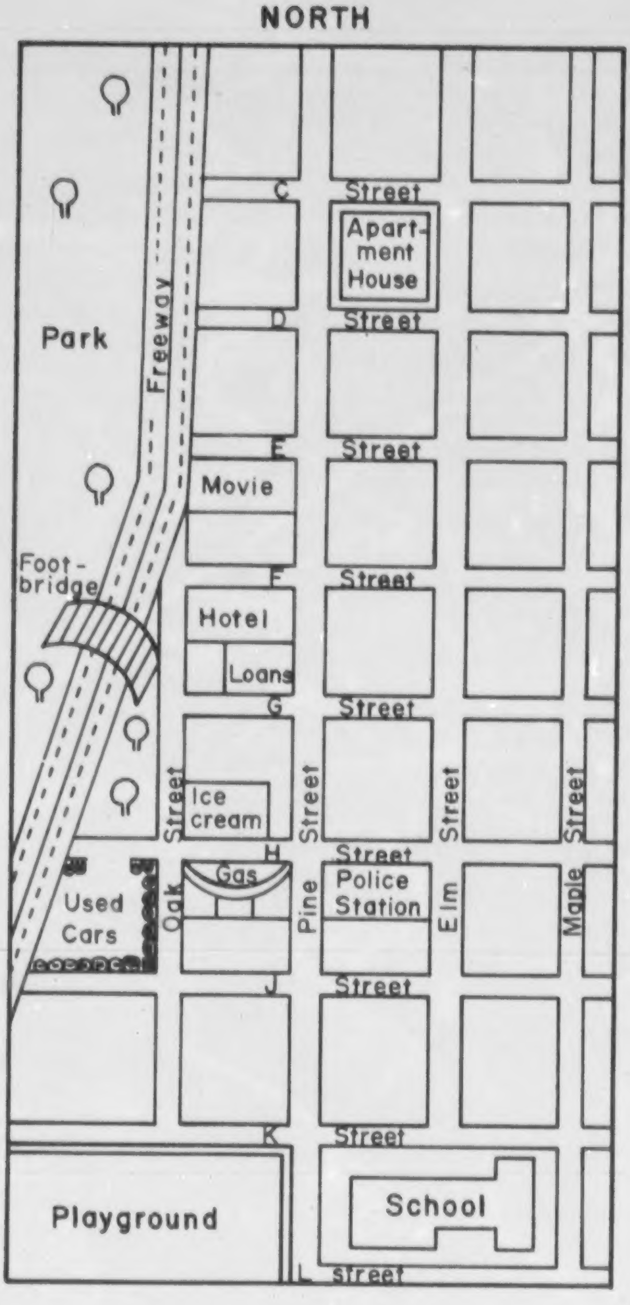
69. The park covers about how many blocks?

    a. one
    b. two
    c. three
    d. six

70. Which of these is located in the same block with the hotel?

    a. movie
    b. loans
    c. ice cream store
    d. police station

APPENDIX B


NORTH
C Street
Apart-ment House
D Street
Park
Freeway
E Street
Movie
F Street
Foot-bridge
Hotel
Loans
G Street
Ice cream
Oak Street
Pine Street
Elm Street
Maple Street
H Street
Gas
Police Station
Used Cars
J Street
K Street
Playground
School
L street

APPENDIX C

Percentages of Pupils' Responses by CA and IQ to Each Option of the 70-item Test

Item	Option	Lower IQ (50-64)		Higher IQ (65-80)	
		CA (13-15)	CA (16-19)	CA (13-15)	CA (16-19)
1	a	10	12	11	9
	b	4	4	5	4
	c	10	10	8	7
	d	75	75	76	79
2	a	8	8	8	8
	b	33	33	27	23
	c	23	24	32	31
	d	35	35	31	36
3	a	4	4	4	5
	b	4	4	2	3
	c	92	92	93	91
	d	0	0	1	1
4	a	31	31	27	24
	b	35	35	35	32
	c	2	4	8	7
	d	29	27	29	35
5	a	17	18	14	16
	b	25	27	29	31
	c	12	12	8	7
	d	46	43	49	46
6	a	90	90	93	94
	b	8	8	5	4
	c	0	0	0	0
	d	0	0	0	0
7	a	6	6	5	4
	b	15	14	10	10
	c	58	59	65	68
	d	21	22	20	18
8	a	10	10	8	7
	b	2	2	2	3
	c	0	0	0	0
	d	87	88	89	90

APPENDIX C (cont'd)

Percentages of Pupils' Responses by CA and IQ to Each Option of the 70-item Test

Item	Option	Lower IQ (50-64)		Higher IQ (65-80)	
		CA (13-15)	CA (16-19)	CA (13-15)	CA (16-19)
9	a	10	10	8	7
	b	8	10	8	7
	c	67	65	64	67
	d	10	12	17	17
10	a	6	8	6	6
	b	0	0	0	0
	c	85	82	80	82
	d	6	8	12	10
11	a	19	22	25	27
	b	17	16	12	12
	c	35	35	32	29
	d	21	27	31	32
12	a	6	6	4	3
	b	4	4	4	4
	c	0	0	2	2
	d	90	90	90	92
13	a	23	24	23	22
	b	6	6	4	4
	c	56	57	57	58
	d	12	12	15	15
14	a	15	14	14	15
	b	25	24	21	19
	c	27	31	32	36
	d	31	29	31	30
15	a	35	35	36	36
	b	21	20	15	16
	c	35	35	43	44
	d	8	10	6	5
16	a	23	22	21	18
	b	6	6	4	3
	c	8	8	5	5
	d	62	65	70	75

APPENDIX C (cont'd)

Percentages of Pupils' Responses by CA and IQ to Each Option of the 70-item Test

Item	Option	Lower IQ (50-64)		Higher IQ (65-80)	
		CA (13-15)	CA (16-19)	CA (13-15)	CA (16-19)
17	a	8	10	6	6
	b	77	76	83	83
	c	0	0	1	1
	d	12	12	8	8
18	a	81	82	80	81
	b	12	12	14	14
	c	2	2	2	2
	d	4	4	4	3
19	a	4	4	2	2
	b	96	96	95	96
	c	0	0	2	2
	d	0	0	0	0
20	a	29	29	33	33
	b	52	53	44	46
	c	15	14	20	20
21	a	44	43	40	42
	b	17	18	18	20
	c	35	35	38	36
22	a	21	20	23	19
	b	2	2	1	1
	c	58	61	63	69
	d	19	18	13	11
23	a	25	24	27	23
	b	21	24	19	23
	c	27	27	31	35
	d	27	25	23	19
24	a	10	10	6	7
	b	8	8	7	6
	c	79	80	85	85
	d	2	2	2	3

APPENDIX C (cont'd)

Percentages of Pupils' Responses by CA and IQ to Each Option of the 70-item Test

Item	Option	Lower IQ (50-64) CA (13-15)	Lower IQ (50-64) CA (16-19)	Higher IQ (65-80) CA (13-15)	Higher IQ (65-80) CA (16-19)
25	a	2	2	1	1
	b	2	2	1	1
	c	8	8	5	4
	d	87	88	93	94
26	a	4	4	2	3
	b	6	6	4	3
	c	85	86	92	93
	d	4	4	2	2
27	a	2	2	1	2
	b	4	4	4	3
	c	75	76	79	80
	d	19	18	17	15
28	a	2	2	2	2
	b	4	4	2	3
	c	87	88	92	93
	d	6	6	4	3
29	a	8	8	5	4
	b	15	14	8	7
	c	75	76	86	88
	d	2	2	1	2
30	a	69	69	74	76
	b	10	12	8	9
	c	0	0	2	2
	d	17	16	11	8
31	a	27	27	19	19
	b	10	10	7	6
	c	10	10	7	6
	d	50	51	63	66
32	a	12	12	10	7
	b	6	10	12	9
	c	56	53	57	62
	d	25	25	21	21

Percentages of Pupils' Responses by CA and IQ

to Each Option of the 70-item Test

Item	Option	Lower IQ (50-64)		Higher IQ (65-80)	
		CA (13-15)	CA (16-19)	CA (13-15)	CA (16-19)
33	a	8	10	10	9
	b	25	25	25	29
	c	35	35	39	37
	d	31	29	26	24
34	a	12	12	13	11
	b	12	14	17	17
	c	19	20	13	11
	d	54	53	56	60
35	a	35	33	36	38
	b	42	45	46	47
	c	23	22	17	14
	d	0	0	1	1
36	a	12	12	10	8
	b	4	4	2	2
	c	81	82	86	87
	d	2	2	2	3
37	a	4	4	2	3
	b	4	4	2	2
	c	90	90	94	94
	d	2	2	1	1
38	a	6	8	8	11
	b	10	10	6	5
	c	48	47	46	48
	d	33	33	38	36
39	a	31	31	27	26
	b	2	2	1	2
	c	2	2	1	1
	d	62	63	69	70
40	a	37	39	46	52
	b	29	29	31	26
	c	6	6	5	6
	d	21	20	14	13

APPENDIX C (cont'd)

Percentages of Pupils' Responses by CA and IQ to Each Option of the 70-item Test

		Lower IQ (50-64)		Higher IQ (65-80)	
Item	Option	CA (13-15)	CA (16-19)	CA (13-15)	CA (16-19)
41	a	19	18	15	13
	b	8	8	7	7
	c	62	63	67	70
	d	10	10	10	9
42	a	35	33	25	21
	b	4	4	2	3
	c	50	51	64	67
	d	8	8	6	7
43	a	81	78	79	81
	b	6	6	8	7
	c	0	0	0	0
	d	10	12	11	9
44	a	33	31	25	23
	b	58	57	63	64
	c	4	4	4	4
	d	2	4	6	6
45	a	23	22	20	23
	b	10	10	7	7
	c	10	10	8	7
	d	54	55	62	61
46	a	29	27	24	21
	b	12	12	13	11
	c	8	8	5	5
	d	50	53	57	63
47	a	10	10	7	7
	b	6	6	10	11
	c	42	45	42	43
	d	42	39	42	38
48	a	21	20	20	21
	b	8	8	6	6
	c	56	59	62	63
	d	15	14	12	11

APPENDIX C (cont'd)

Percentages of Pupils' Responses by CA and IQ to Each Option of the 70-item Test

Item	Option	Lower IQ (50-64) CA (13-15)	Lower IQ (50-64) CA (16-19)	Higher IQ (65-80) CA (13-15)	Higher IQ (65-80) CA (16-19)
49	a	6	6	7	7
	b	6	6	5	5
	c	83	84	86	84
	d	4	4	2	4
50	a	52	53	58	60
	b	12	14	10	8
	c	27	25	25	25
	d	8	8	7	7
51	a	4	4	4	3
	b	62	65	60	59
	c	12	12	13	12
	d	21	20	24	26
52	a	73	75	69	66
	b	2	2	6	5
	c	23	22	24	28
	d	2	2	1	1
53	a	17	18	17	16
	b	4	6	5	5
	c	44	41	40	40
	d	33	33	36	37
54	a	29	27	24	21
	b	23	22	26	34
	c	6	6	6	7
	d	42	45	43	37
55	a	81	82	76	78
	b	10	10	11	10
	c	6	6	11	9
	d	2	2	2	3
56	a	52	51	43	41
	b	10	12	17	16
	c	12	12	17	21
	d	23	24	23	21

APPENDIX C (cont'd)

Percentages of Pupils' Responses by CA and IQ to Each Option of the 70-item Test

Item	Option	Lower IQ (50-64)		Higher IQ (65-80)	
		CA (13-15)	CA (16-19)	CA (13-15)	CA (16-19)
57	a	21	20	19	18
	b	29	31	39	42
	c	6	6	10	7
	d	42	41	31	32
58	a	17	18	15	13
	b	8	8	6	6
	c	71	71	76	79
	d	4	4	2	3
59	a	21	24	20	18
	b	48	47	55	57
	c	12	12	13	14
	d	17	16	11	10
60	a	37	39	39	41
	b	15	16	13	15
	c	12	12	12	13
	d	33	31	35	30
61	a	27	27	30	27
	b	15	14	13	17
	c	44	45	49	48
	d	15	14	8	8
62	a	10	14	11	11
	b	44	41	46	48
	c	42	39	37	36
	d	2	4	5	4
63	a	4	4	4	4
	b	79	80	81	84
	c	6	6	5	4
	d	10	10	11	8
64	a	92	92	94	94
	b	4	4	2	3
	c	4	4	4	3
	d	0	0	0	0

APPENDIX C (cont'd)

Percentages of Pupils' Responses by CA and IQ to Each Option of the 70-item Test

Item	Option	Lower IQ (50-64) CA (13-15)	Lower IQ (50-64) CA (16-19)	Higher IQ (65-80) CA (13-15)	Higher IQ (65-80) CA (16-19)
65	a	12	12	10	9
	b	79	80	86	86
	c	4	4	2	2
	d	4	4	2	3
66	a	8	8	6	5
	b	12	12	8	9
	c	79	80	86	86
	d	0	0	0	0
67	a	19	18	13	12
	b	10	12	13	15
	c	19	18	21	23
	d	48	47	48	46
68	a	37	35	27	29
	b	6	8	18	18
	c	35	35	38	36
	d	19	18	13	14
69	a	8	8	10	8
	b	23	22	17	19
	c	35	37	32	29
	d	33	33	39	42
70	a	35	39	37	32
	b	29	27	27	33
	c	17	16	15	16
	d	19	18	17	17

APPENDIX D

BATTLE CHIPS

ALL YOU NEED IS...

1. Question Cards. There are 70 question cards. On one side of each card is a question which was presented to a large sample of junior and senior high school educable mentally retarded children of different ages and intellectual levels. The students read along with the examiner who read each item aloud. Then the students circled the answer of their choice. The reverse side of each question card contains a table showing the percentages of the students' (grouped by age and IQ levels) responses to each choice for the item.

2. Age Level Cards (Yellow). Each of these cards contains one of two age levels: younger (CA 13-15) or older (CA 16-19). They allow the age levels to be selected by chance.

3. IQ Level Cards (Blue). Each of these cards contains one of two IQ levels: lower (IQ 50-64) or higher (IQ 65-80). They allow the IQ levels to be selected by chance.

4. Chips. The chips are standard poker chips, and each player is provided a different color.

5. Response Sheets. Each player is provided several response sheets upon which he writes his predictions. He also puts the correct percentages on the response sheet and puts a check mark if his prediction is within the specified limits.

WHAT IT'S ALL ABOUT...

The object of this game is to acquire the greatest number of chips. Chips are obtained by successfully anticipating or predicting the percentages of a specified group of children responding to each choice of a given question. The game can be played by two to four players.

FOREPLAY

Prior to beginning the actual play, the players seat themselves around some flat playing surface. Question cards are shuffled as are the IQ level cards (blue) and the age level cards (yellow). Question cards are arranged with the question face up, and the other cards are arranged face down. One player conceals one chip of each color in his hand. The players then draw chips, and each player takes 20 chips of his color. The player with the blue chip is the dealer for the first round. The deal passes clockwise for successive rounds.

CHIPS AHOY!

1. *Ante*. Each player antes four chips at the beginning of each round.

2. *Determining the variables*. The dealer turns over the top IQ level card and the top age level card. He then removes the top question card exposing the question for this round. This card may not be removed from the pile until Step 3 is completed.

3. *Estimating percentages*. After making sure that everyone has seen the age and IQ levels, the dealer reads the question card aloud while the other players read along. (The question card should be placed so that everyone can read the question.) Then *all* players anticipate or predict the percentages of responses by students of the specified age and IQ levels *for each of the choices* for that particular item. The predicted percentages may, but need not, add up to 100 percent. The predictions are written down in the appropriate speces on the response sheets.

4. *Finding the percentages*. The dealer now turns the question card over and reads aloud from the table the actual percentages obtained for each choice for the group specified. All players write these in the column next to their predictions.

5. *Checking predictions*. All players compare their predicted percentages to the actual percentages. The player puts a check mark next to each prediction which is within 5 percentage points of either side of the actual percentage.

6. *Acquiring chips*. Each player takes one chip from the pot for each check mark he made.

7. *Winning the round*. The player who picked up the most chips gets all the chips in the pot. In case of a tie among all of the players, the remaining chips stay in the pot for the next round. In case of two winners, they split the chips remaining in the pot. If the pot cannot be split evenly, the remaining chip is left for the next round.

8. *Winning the game*. Play proceeds as described above for five rounds. This is the case even if, in the fifth round, there is a tie and chips remain in the pot. Following the completion of the fifth round, the player with the most chips wins the game.

APPENDIX E

BATTLE CHIPS

RESPONSE SHEET

Name ________________________

Date ________________________

	PREDICTION %	ACTUAL %	CHECKS
Question # ______	a. ______	a. ______	______
Age: Older ____ Younger ____	b. ______	b. ______	______
IQ: Higher ____ Lower ____	c. ______	c. ______	______
	d. ______	d. ______	______
Question # ______	a. ______	a. ______	______
Age: Older ____ Younger ____	b. ______	b. ______	______
IQ: Higher ____ Lower ____	c. ______	c. ______	______
	d. ______	d. ______	______
Question # ______	a. ______	a. ______	______
Age: Older ____ Younger ____	b. ______	b. ______	______
IQ: Higher ____ Lower ____	c. ______	c. ______	______
	d. ______	d. ______	______
Question # ______	a. ______	a. ______	______
Age: Older ____ Younger ____	b. ______	b. ______	______
IQ: Higher ____ Lower ____	c. ______	c. ______	______
	d. ______	d. ______	______
Question # ______	a. ______	a. ______	______
Age: Older ____ Younger ____	b. ______	b. ______	______
IQ: Higher ____ Lower ____	c. ______	c. ______	______
	d. ______	d. ______	______
Question # ______	a. ______	a. ______	______
Age: Older ____ Younger ____	b. ______	b. ______	______
IQ: Higher ____ Lower ____	c. ______	c. ______	______
	d. ______	d. ______	______
Question # ______	a. ______	a. ______	______
Age: Older ____ Younger ____	b. ______	b. ______	______
IQ: Higher ____ Lower ____	c. ______	c. ______	______
	d. ______	d. ______	______
Question # ______	a. ______	a. ______	______
Age: Older ____ Younger ____	b. ______	b. ______	______
IQ: Higher ____ Lower ____	c. ______	c. ______	______
	d. ______	d. ______	______

APPENDIX E (cont'd)

BATTLE CHIPS

RESPONSE SHEET

Name ___________________

Date ___________________

	PREDICTION %	ACTUAL %	CHECKS
Question # ___			
Age: Older___ Younger___	a. ________	a. ________	______
IQ: Higher___ Lower___	b. ________	b. ________	______
	c. ________	c. ________	______
	d. ________	d. ________	______
Question # ___			
Age: Older___ Younger___	a. ________	a. ________	______
IQ: Higher___ Lower___	b. ________	b. ________	______
	c. ________	c. ________	______
	d. ________	d. ________	______
Question # ___			
Age: Older___ Younger___	a. ________	a. ________	______
IQ: Higher___ Lower___	b. ________	b. ________	______
	c. ________	c. ________	______
	d. ________	d. ________	______
Question # ___			
Age: Older___ Younger___	a. ________	a. ________	______
IQ: Higher___ Lower___	b. ________	b. ________	______
	c. ________	c. ________	______
	d. ________	d. ________	______
Question # ___			
Age: Older___ Younger___	a. ________	a. ________	______
IQ: Higher___ Lower___	b. ________	b. ________	______
	c. ________	c. ________	______
	d. ________	d. ________	______
Question # ___			
Age: Older___ Younger___	a. ________	a. ________	______
IQ: Higher___ Lower___	b. ________	b. ________	______
	c. ________	c. ________	______
	d. ________	d. ________	______
Question # ___			
Age: Older___ Younger___	a. ________	a. ________	______
IQ: Higher___ Lower___	b. ________	b. ________	______
	c. ________	c. ________	______
	d. ________	d. ________	______

APPENDIX F

TEACHER QUESTIONNAIRE I

Date ____________

1. Name ____

2. Sex: M ______ F ______

3. Age ________________ Date of Birth ________________

4. School ____

5. Grade or Level ________________________

6. Subject(s) ____

7. Self-contained class: Yes ______ No ______

8. Do you have a teaching certificate? Yes ______ No ______

9. If "yes" in number 8, is it for teaching the mentally retarded?
Yes ______ No ______

10. If "no" in number 9, for what type(s) of student(s) are you certified?

____

11. What is your educational level?
Less than a B. A. ____________
Bachelor's Degree ____________
Master's Degree ____________
Master's + 30 hrs. ____________

12. Check the Special Education Courses you have taken. (Course titles may vary somewhat from the courses you have taken.)
Introduction to Exceptional Children ________________
Introduction to Mental Retardation ________________
Curriculum and Methods for the EMR ________________
Student Teaching with the EMR ________________

13. How many years have you taught? ________________

14. How many years have you taught the mentally retarded? __________

APPENDIX G

Name ________________

Date ________________

GAME OPINIONAIRE

Please answer the following questions as honestly as possible. All responses will be considered strictly confidential.

Please make one check mark for each item.

1. The game I played was Battle Chips ____ Perception ____
2. I played the game in
   Early morning ____ Early afternoon ____
   Mid morning ____ Mid afternoon ____
   Late morning ____ Late afternoon ____
3. I thought the game was Very interesting ____ Somewhat interesting ____ Not interesting and not boring ____ Somewhat boring ____ Very boring ____
4. Competing with another teacher in playing the game was
   Very motivating ____ Somewhat motivating ____ Not motivating and not inhibiting ____ Somewhat inhibiting ____ Very inhibiting ____
5. In competing against another teacher I felt Very much at ease ____
   Somewhat at ease ____ Not at ease and not uncomfortable ____
   Somewhat uncomfortable ____ Very uncomfortable ____
6. I thought the instructions for playing the game were Very complicated ____
   Somewhat complicated ____ Not too complicated and not too simple ____
   Rather simple ____ Very simple ____
7. I feel that the time I spent playing the game was
   More than enough time ____ Enough time ____ Neither too little nor too much time ____ Not enough time ____ Definitely not enough time ____
8. Having me play the game during part of the school day was
   An excellent idea ____ A good idea ____ Neither a good idea nor a bad idea ____ A bad idea ____ A very bad idea ____
9. The time of day when I played the game was
   The best possible time ____ A good time ____ Neither a good nor a bad time ____ A bad time ____ The worst possible time ____

GAME OPINIONAIRE

10. From this game I feel I learned A great deal ____ Something ____ Very little ____ Almost nothing ____ Nothing ____

APPENDIX G (cont'd)

GAME OPINIONAIRE

Any comments, whether positive or negative, regarding your impressions of the game would be appreciated. Feel free to comment on the format of the game, instructions for playing, and manner of playing, etc.

APPENDIX H

TEACHER QUESTIONNAIRE II

Name ____________

Date ____________

Your responses to the following questions would be appreciated. All information will be considered confidential and no information on specific responses of individuals will be revealed to representatives of the Cincinnati Public Schools.

1. How many years have you taught EMR children in the Cincinnati Public School System? ________

2. Do you own a copy of the Cincinnati Curriculum Guide (The Slow Learning Program in the Elementary and Secondary Schools)?

   Yes ______ No ______

3. When was the last time you referred to the Curriculum Guide?

   In the past week ____________

   In the past two weeks ____________

   In the past month ____________

   In the past two months ____________

   In the past year ____________

   Not this year ____________

4. Approximately how many times have you referred to the Curriculum Guide this year?

   Over 100 ____ 50 100 ______ 25-50 ______

   15-25 ____ 5- 15 ______ less than 5 ____

5. Do you feel the Curriculum Guide helps you in your teaching?

   Yes ______ No ______

APPENDIX I

DIRECTIONS: Read each of the questions below. Then pick the answer which you think is the right answer. Put a circle around the letter of that answer. You can use paper and pencil to work arithmetic problems.

1. Which of these is an odd number?

   a. 2
   b. 5
   c. 4
   d. 10

2. Bob has a dog 1 foot tall. How many inches tall is the dog?

   a. 2
   b. 6
   c. 12
   d. 10

Before answering questions 3 and 4, look at the map on the last page.

3. What is at the corner of Oak Street and H. Street?

   a. the hotel
   b. the school
   c. the police station
   d. the ice cream store

4. In what direction would you be walking if you were going from the playground to the movie?

   a. east
   b. south
   c. north
   d. west

5. If you want to go out on dates, it is a good idea to

   a. sit home alone most of the time
   b. watch a lot of T.V.
   c. go places where you can meet people
   d. talk about other people behind their backs

6. When you get a cold, you should

   a. take a shower
   b. smoke cigarettes
   c. take aspirin
   d. eat cookies

7. The paper you fill out so you can get a job is called

   a. an application
   b. a communication
   c. a check
   d. an order

8. In the United States, to work people have to have a

   a. Union Card
   b. Identity Card
   c. Social Security Card
   d. Immigration Card

In 9-12 below, put a circle around the letter of the word that is spelled wrong.

9. a. for
   b. smell
   c. stor
   d. eaten

10. a. meals
    b. lunch
    c. bear
    d. hott

11. a. hurry
    b. stay
    c. frosen
    d. gift

12. a. glad
    b. cake
    c. rane
    d. speak

In 13-16 below put a circle around the letter of the word that means the same as the first word.

13. couple

    a. four
    b. three
    c. two
    d. five

14. spoiled

    a. spilled
    b. eaten
    c. no good
    d. very cold

APPENDIX I (cont'd)

15. quickly

a. quietly
b. fast
c. later
d. right

16. return

a. stay
b. leave
c. dream of
d. go back

17. Which of these is the longest amount of time?

a. 100 days
b. 7 months
c. 20 weeks
d. one-half year

18. If you bought a bag of candy for 37¢ and paid for it with a dollar bill, how much change would you get back?

a. 21¢
b. 84¢
c. 63¢
d. 71¢

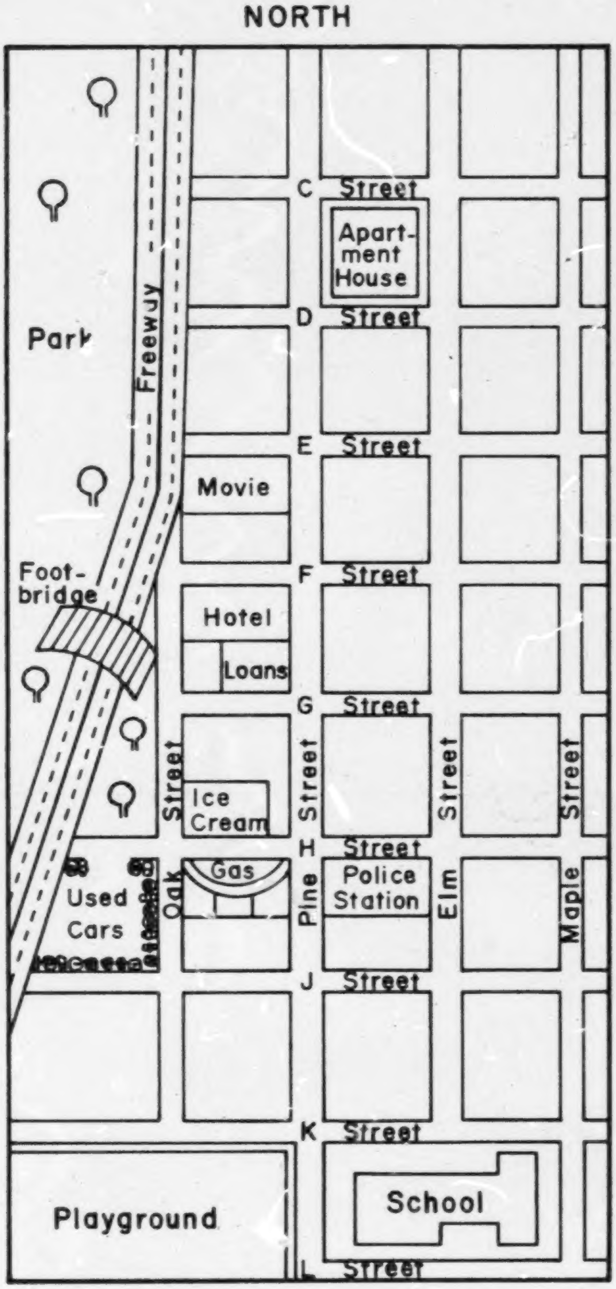
19. Six quarters and fifteen dimes is the same as

a. $2.00
b. $3.00
c. $4.00
d. $5.00

20. How would you write 29 in Roman numerals?

a. XVIII
b. XXIX
c. XIX
d. XXIV

APPENDIX I


NORTH
Park
Freeway
Foot-bridge
C Street
Apart-ment House
D Street
E Street
Movie
F Street
Hotel
Loans
G Street
Ice Cream
Oak Street
Pine Street
Elm Street
Maple Street
H Street
Gas
Police Station
Used Cars
J Street
K Street
Playground
School
L Street

APPENDIX J

Name________________________________

School______________________________

Date________________________________

Directions: Attached are 20 questions. Please read each question. Then, next to its corresponding number, predict the actual response (a, b, c or d) that you feel each student listed would have selected. You may assume that each question was read aloud as the students read along. The students also had the opportunity to use paper and pencil to figure arithmetic problems.

STUDENTS' NAME QUESTIONS										
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										
20										

Appendix K

Teacher Assessment of Pupil General Ability Levels

Please indicate by checking where, in your class, the following students fall in regard to their general ability.

Pupil's Name	Bottom 25%	Lower 25% (25-50%)	Upper 25% (50-75%)	Top 25%
1. ____________				
2. ____________				
3. ____________				
4. ____________				
5. ____________				
6. ____________				
7. ____________				
8. ____________				
9. ____________				
10. ____________				

APPENDIX L

Raw Deviation Scores for 15 Experimental Subjects
Across 30 Sequentially Arranged Questions

TEACHER CODE NUMBERS

Question Number	101	103	201	301	401	404	501	613	616	711	712	714	716	811	812
1	34	36	23	30	93	89	16	124	84	163	41	62	84	105	76
2	42	75	69	40	26	79	147	10	54	29	31	6	9	124	74
3	30	19	66	99	125	46	116	110	40	92	110	46	74	33	99
4	22	12	62	84	51	36	62	84	86	105	57	29	47	50	33
5	18	8	66	72	102	5	54	40	35	84	89	28	35	64	59
6	160	22	60	19	55	57	40	28	64	43	25	52	23	41	21
7	58	28	70	102	73	54	42	64	17	100	47	25	30	73	36
8	36	19	55	56	30	49	98	26	20	37	45	12	39	60	20
9	73	30	53	81	100	57	61	102	33	54	124	80	2	54	170
10	35	59	46	51	69	18	62	31	37	133	97	28	87	35	13
11	59	24	8	64	117	28	42	103	77	13	47	108	96	26	66
12	112	99	72	30	60	27	19	50	50	33	80	11	63	80	34
13	68	108	7	75	76	90	66	15	66	65	115	53	45	40	14
14	61	12	24	28	63	44	15	57	57	83	48	32	42	65	43
15	24	17	69	85	183	8	114	12	84	21	63	94	63	77	10

APPENDIX L (cont.)

Raw Deviation Scores for 15 Experimental Subjects

Across 30 Sequentially Arranged Questions

TEACHER CODE NUMBERS

Question Number	101	103	201	301	401	404	501	613	616	711	712	714	716	811	812
16	97	88	106	40	24	65	28	24	37	64	33	8	7	143	113
17	74	22	62	102	60	72	114	23	66	56	20	29	71	74	59
18	57	105	39	7	38	51	10	36	22	49	30	24	141	36	36
19	100	65	95	38	100	25	96	11	24	62	40	111	98	33	31
20	84	82	67	[illegible]	86	7	55	20	13	26	91	20	5	106	51
21	108	35	39	14	69	16	7	105	73	53	31	128	33	50	73
22	65	35	66	18	30	58	14	15	34	18	61	38	20	28	24
23	38	62	27	54	94	35	46	38	18	113	33	117	36	23	59
24	64	59	17	52	83	52	29	38	29	79	61	96	75	34	13
25	68	80	70	38	30	102	63	61	35	39	67	47	32	16	39
26	42	15	48	24	66	38	22	101	46	119	60	97	88	41	57
27	30	25	[illegible]	10	54	43	5	55	46	40	116	44	40	60	89
28	68	30	50	24	55	65	16	14	20	26	58	59	80	25	19
29	57	40	42	10	45	20	15	53	44	69	75	15	29	65	35
30	80	11	91	44	47	47	32	21	32	56	163	44	41	24	14

209